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Buparvaquone tissue residue study

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Abstract

Bovine anaemia caused by *Theileria orientalis* is a tick borne disease which has been identified as the cause of significant morbidity and mortality of cattle, particularly in eastern Australia. Buparvaquone (BPQ) is expected to be a highly effective chemotherapeutic which is supported by efficacy studies (MLA project B.AHE.0048). Currently BPQ is not registered for use in Australia. This tissue depletion study provides data that could be used by industry to establish a withholding period for BPQ. Detectable residues were present in meat, back fat and perirenal fat up to 119 days post treatment. Quantifiable residues were still present in liver, kidney and neck muscle (site of administration) 147 days post treatment.

Executive summary

Bovine anaemia caused by *Theileria orientalis* is a tick borne disease and is widespread throughout Australia. However despite the widespread distribution, losses were most unusual even though parasitaemias of up to 20% and occasionally higher were seen. Since 2006, NSW Department of Primary Industries (DPI) Veterinary Laboratories have received an increasing number of submissions where Bovine anaemia caused by *Theileria orientalis* was diagnosed.

There is no remedy registered for use against Bovine Anaemia in Australia. Veterinarians who have treated cattle with remedies registered for other uses in Australia report variable outcomes. To-date controls have not been included so it is not possible to determine with certainty the effectiveness of treatments. Based on literature searches, buparvaquone (BPQ) is expected to be a highly effective chemotherapeutic which is supported by efficacy studies (MLA project B.AHE.0048). Manufacturers have indicated that the projected size of the market does not warrant the costs associated with registration of BPQ in Australia. It has been suggested veterinarians could apply to the Australian Pesticides and Veterinary Medicines Authority (APVMA) for consent to import an unregistered veterinary chemical product. If a permit was granted, the veterinarian would accept responsibility for residue violations. As the major overseas markets have not established a Maximum Residue Level (MRL), detection of any BPQ or metabolites would be regarded as a violation and have serious ramifications for the veterinarian and for the Australian cattle industry. A withholding period of 42 days was recommended by manufacturers of BPQ sold in overseas markets based on methodologies available in the late 1970s. Technological advances can be expected to have lowered detection limits since then.

This project involved conducting a tissue residue depletion study. Cattle in store condition were treated with BPQ 2 times 48 hours apart at the recommended dose (2.5mg/kg high up on the neck with a maximum of 10mL per injection site). Seventy-two cattle were treated which allowed for 12 sampling times with six animals sampled at each time. The animals were housed outdoors before and after treatment in accordance with normal agricultural practice. Two untreated control cattle were also included. Animals were managed in accordance with the Animal Research Authority.

Tissues (injection site neck muscle, skeletal muscle, liver, kidney, subcutaneous fat and peri-renal fat) were collected at days 7, 14, 28, 42, 56, 70, 84, 98, 119, 147, 175, and 203 after treatment. Samples were chilled following collection and placed in a freezer (-20^0C) within five to six hours of collection. Samples were held frozen till tested. Buparvaquone residues were determined according to the method *"Determination of Buparvaquone Residues in Bovine Tissues and Milk by HPLC/MS/MS"* (see MLA project B.AHE.0078).

Quantifiable residues of BPQ (>0.01 mg/kg) were found in all of the supplied tissue samples collected seven days after treatment (DAT).

The range of residues found in the tissue samples at each sampling point are presented in the table below:

DAT	Buparvaquone mg/kg					
	Neck Muscle	Muscle	Liver	Kidney	Perirenal Fat	Back Fat
7	34.2 - 1159.0	0.010 - 0.017	1.25 - 1.49	0.29 - 0.34	0.085 - 0.16	0.091 - 0.15
14	103.5 - 715.6	0.013 - 0.017	1.31 - 1.60	0.26 - 0.31	0.054 - 0.097	0.050 - 0.10
28	0.36 - 305.4	<LOD - 0.016	0.40 - 1.51	0.073 - 0.24	0.005* - 0.050	0.006* - 0.055
42	1.20 - 235.0	<LOD - 0.014	0.80 - 1.40	0.12 - 0.25	0.011 - 0.061	0.011 - 0.059
56	4.36 - 132.2	<LOD - 0.009*	0.089 - 0.88	0.013 - 0.15	<LOD - 0.017	<LOD - 0.022
70	25.1 - 57.2	<LOD - 0.010	0.17 - 0.35	0.046 - 011	<LOD - 0.007*	0.006* - 0.016
84	1.95 - 78.7	<LOD - 0.008*	0.14 - 0.29	0.052 - 0.090	<LOD - 0.007*	0.007* - 0.017
98	0.012 - 72.6	<LOD - 0.006*	0.061 - 0.25	0.013 - 0.068	<LOD - 0.007*	<LOD - 0.011
119	0.031 - 60.5	All <LOD	0.073 - 0.17	0.015 - 0.054	All <LOD	All <LOD
147	2.79 - 101.1	All <LOD	0.040 - 0.20	0.009* - 0.038	All <LOD	All <LOD

LOD = Limit of detection = 0.005 mg/kg
LOQ = Limit of quantitation = 0.01 mg/kg
DAT = Days After Treatment

Note: Results marked with * are between the LOD and LOQ, as the reported values are less than the LOQ, by definition, their accuracy and precision cannot be verified.

All tissue samples for perirenal fat, back fat and muscle were below the limit of detection (LOD; 0.005mg/kg) at 119 days post-treatment. BPQ was detected in all samples from the kidneys, liver and neck muscle at DAT 147. Tissue samples were collected at DAT 175 and 203 but were not tested because the rate of decline was such that neck muscle residues were unlikely to decline to <LOD. Samples from all tissues from all animals are being held frozen and are available for further testing if required.

This study provides details of BPQ depletion in a range of tissues following treatment at the recommended dose. This information could be used to determine an appropriate withholding period for BPQ , thus avoiding violative residues in the meat from treated cattle.

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1. Background

Bovine anaemia caused by *Theileria orientalis* is a tick borne disease and is widespread throughout Australia. Despite the widespread distribution, losses were most unusual prior to 2006 even though parasitaemias of up to 20% and occasionally higher were seen in stained thin blood smears.

Since 2006 NSW DPI Veterinary Laboratories have received an increasing number of submissions where Bovine anaemia caused by *Theileria orientalis* was diagnosed. A Theileriosis Workshop in 2009 resulted in the formation of a Theileria Working Group (TWG). The TWG has examined the research priorities that would lead to a better understanding of the disease and provide farmers with products that would either prevent disease or improve treatment outcomes when disease occurred.

Veterinarians who have treated cattle report variable outcomes with chemotherapeutics registered for use in Australia for purposes other than Bovine Anaemia. To-date controls have not been included so it is not possible to determine with certainty the effectiveness of treatments. Based on literature searches, buparvaquone (BPQ) is expected to be a highly effective chemotherapeutic which is supported by efficacy studies conducted by Queensland Department of Primary Industries with support from MLA (B.AHE.0048).

There is no remedy registered for use against *T orientalis* in Australia. The TWG has actively promoted full registration of buparvaquone. Two private companies which manufacture BPQ have indicated that the projected size of the market does not warrant the costs associated with registration, especially since the BPQ molecule no longer enjoys patent protection. It has been suggested that it would be possible for a veterinarian to apply to the Australian Pesticides and Veterinary Medicines Authority (APVMA) for consent to import unregistered veterinary chemical products. If a permit was granted, the veterinarian would accept responsibility for the fate of treated animals, including tissue residues in animals entering the human food chain. As the major overseas markets have not established a Maximum Residue Level (MRL), detection of any BPQ or metabolites would be regarded as a violation with possible serious ramifications for the veterinarian and for the Australian cattle industry. A withholding period of 42 days is provided by manufacturers selling BPQ in overseas markets based on methodologies available in the late 1970s. Technological advances can be expected to have lowered detection limits since then. Hence a buparvaquone tissue residue study has been conducted that provides data establishing the time required after treatment for BPQ levels to decline below the Limit of Detection (LOD).

2. Project objectives

To conduct a tissue residue study in cattle using buparvaquone.

3. Methodology

Cattle in store condition were treated with BPQ (Butalex® MSD, BPQ 50 mg/mL) 2 times 48 hours apart at the maximum recommended dose (2.5mg/kg) by injection high up on the neck, with a maximum of 10mL per injection site. Seventy-two cattle were treated which allowed for 12 sampling times with 6 animals sampled at each time. The animals were housed outdoors before and after treatment in accordance with normal agricultural practice. Two untreated control cattle were also included. Animals were managed in accordance with the requirements of the Animal Research Authority.

Tissues (injection site muscle, skeletal muscle (psoas major muscle), liver, kidney, subcutaneous fat and peri-renal fat) were collected at days 7, 14, 28, 42, 56, 70, 84, 98, 119, 147, 175, and 203 after treatment. Samples were chilled following collection and placed in a freezer (-20^{0}C) within 5-6 hours of collection. Samples were held frozen till tested. BPQ residues were determined according to the method *"Determination of Buparvaquone Residues in Bovine Tissues and Milk by HPLC/MS/MS"* (see MLA project B.AHE.0078).

The full details of methods are provided at Appendix 1.

4. Results

Quantifiable residues of BPQ (>0.01 mg/kg) were found in all of the supplied samples of bovine tissue 7 days after treatment (DAT).

The range of residues found in the tissue samples at each sampling point are presented in the table below:

DAT	Buparvaquone mg/kg					
	Neck Muscle	Muscle	Liver	Kidney	Perirenal Fat	Back Fat
7	34.2 - 1159.0	0.010 - 0.017	1.25 - 1.49	0.29 - 0.34	0.085 - 0.16	0.091 - 0.15
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LOD = Limit of detection = 0.005 mg/kg
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DAT = Days After Treatment

Note: Results marked with * are between the LOD and LOQ, as the reported values are less than the LOQ, by definition, their accuracy and precision cannot be verified.

The average BPQ residue concentrations for the different sampling sites are presented graphically in Figure 1. Please note the logarithmic scale of the Y-axis, to accommodate the wide range of values. Figure 2 provides the same average values, with the exclusion of the neck muscle samples, with the Y-axis on an arithmetic scale.

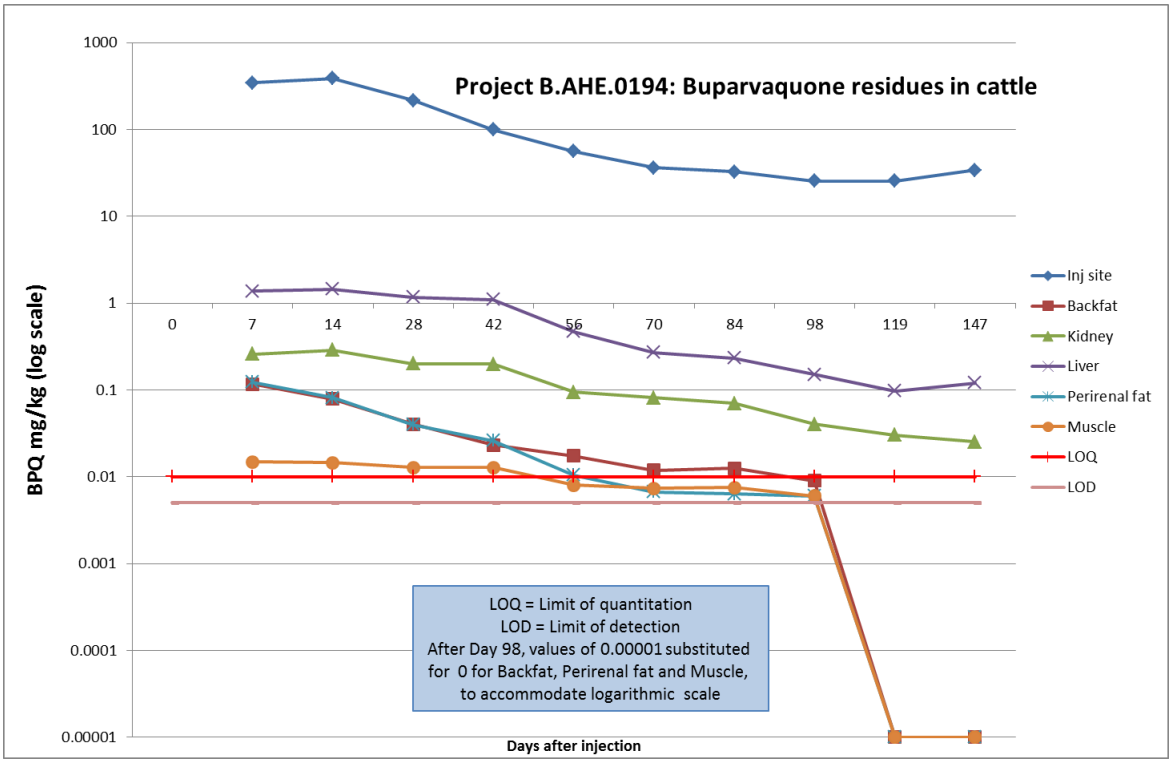

Figure 1: Average BPQ concentrations in all sampled tissues (log scale).

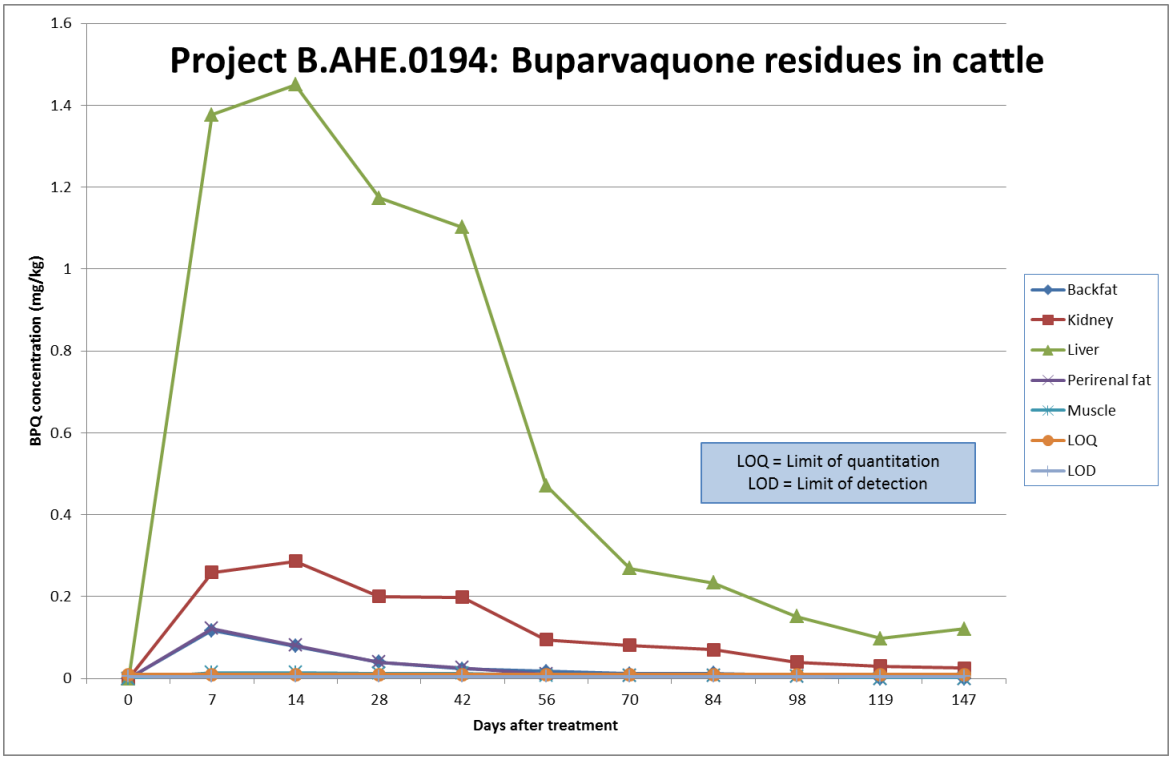

Figure 2: Average BPQ concentrations, excluding the injection site

All perirenal fat, back fat and muscle tissue samples were below the limit of detection (0.005 mg/kg) at DAT 119. However, BPQ was detected in all samples from the kidneys, liver and neck muscle at DAT 147. Significant tissue levels persisted in neck muscles at DAT 147 (2.79-101.1mg/kg). Tissue samples were collected at DAT 175 and 203 but were not tested because the rate of decline was such that neck muscle residues were unlikely to decline to <LOD. Samples from all tissues from all animals are being held frozen and are available for further testing if required.

No significant additional peaks were observed in chromatograms of treated samples compared to the control samples from 1.4-2.1 minutes of the analysis window using the chromatography conditions specified in Appendix 1 Section 2.4. However metabolites of BPQ were not specifically analysed.

The full details of results are provided at Appendix 1.

5. Discussion/conclusion

This study provides industry with the details of BPQ depletion in a range of tissues following treatment at the maximum recommended dose. These showed that by DAT 119, BPQ had declined to <LOD in muscle, perirenal fat and back fat in all cattle sampled. If a withholding period required that tissue levels at 2 time periods were <LOD, it would be necessary to set the period as 147 days. However even at DAT 147, residues persisted in the kidneys and liver. If cattle were to be slaughtered for human consumption, the liver and kidneys would have to be discarded to avoid detectable quantities of BPQ. The highest residue levels as expected were found in the neck muscles, the site of administration. At DAT 147, levels ranged between 2.79 - 101.1 mg/kg. To ensure injection site muscle does not enter the food chain, the neck from treated animals would need to be extensively trimmed.

It is important to note this study only tested BPQ in tissues. While no significant additional peaks were observed in chromatograms of treated samples, metabolites of BPQ were not specifically analysed. Tissues have been held at -20^{0}C and are available if additional analyses were required.

6. Appendix 1

This project was conducted by Agrisearch Services Pty Ltd under a subcontract between Agrisearch Services Pty Ltd and the Department of Primary Industries, an office of the Department of Trade & Investment, Regional Infrastructure & Services, for and on behalf of the State of New South Wales. Appendix 1 is the report received from Agrisearch Services Pty Ltd.

A GLP TISSUE RESIDUE STUDY USING INTRAMUSCULAR INJECTION OF BUTALEX CONTAINING 50 mg/mL BUPARVAQUONE APPLIED TO BEEF CATTLE

AUSTRALIA, 2011-2013

A STUDY CONDUCTED UNDER OECD GOOD LABORATORY PRACTICE [GLP]

Sponsor and Representative	Graham Bailey NSW Department of Primary Industries 1447 Forest Road Orange NSW 2800
Test Facility	Agrisearch Services Pty Ltd 50 Leewood Drive Orange NSW 2800
Study Director	Ian Ridley
Reference Study Plan Number	DPINSW/GLP/11/01
Reference Trial/Job Number	120419
Animal Ethics Approval No.:	1212
Agrisearch Report Number	DPINSW/GLP/11/01-1
Date Submitted	22 July 2013

NATA

This document is issued in accordance with NATA's GLP requirements. Recognised for compliance with the OECD Principles of Good Laboratory Practice. NATA Recognised GLP Facility Number: 14321.

1 Study personnel

Study Director:	Ian Ridley Agrisearch Services Pty Ltd 4/16 Jusfrute Drive West Gosford NSW 2250
Principal Investigator: [Application and Sampling phase]	Megan Kirby (Job Number 120419) Agrisearch Services Pty Ltd 50 Leewood Drive Orange NSW 2800
Principal Investigator: [Analytical phase]	Amy Drewett (Job Number 130212) Agrisearch Analytical Pty Ltd Level 1, 48 Victoria Road Rozelle NSW 2039
Lead Quality Assurance:	Carolyn Johnston Agrisearch Services Pty Ltd 78 Hampton Street Toowoomba Qld 4350

2 Quality assurance

.....(sign and date)
Lead Quality Assurance
Carolyn Johnston

This study DPINSW/GLP/11/01 was conducted under Good Laboratory Practice (GLP). During the conduct of the study the Agrisearch Services Pty Ltd Quality Assurance Unit performed both study specific inspection as well as process based field inspections that were independent of the study. The study was inspected at the following stages:

Date of Inspection	Subject of Inspections	Audit Report Reference	Date Audit Report Submitted to Study Director and Management
19 September 12	Study Plan	QA12-097A	19 September 2012
14 August 2012	In-process – Application	QA12-079B	20 August 2012
13 September 2012	In-process – Sampling	QA12-091C	19 September 2012
23 October 2012	Orange Facility	QA12-126F	23 October 2012
11 July 2013	Final Report	QA13-112E	11 July 2013

The signature above indicates that the Agrisearch Services Pty Ltd Quality Assurance Unit has performed the audits as listed and found that the final report accurately reflects the raw data and that the study was conducted according to the OECD Principles of Good Laboratory Practice.

The analytical phase of the study was audited by the Agrisearch Analytical Pty Ltd Quality Assurance Unit at the following stages:

Date of Inspection	Subject of Inspections	Audit Report Reference	Date Report Submitted to Study Director, Principal Investigator and Management
22 August 2012	Study Plan	DPINSW/GLP/11/01-01	22 August 2012
6 November 2012	Sample Receipt & Sub-Sampling	DPINSW/GLP/11/01-02	6 November 2012
13 November 2012	In-Process	DPINSW/GLP/11/01-03	13 November 2012
19 March 2013	Report & Data	DPINSW/GLP/11/01-04	10 May 2013

A signed quality assurance statement from Agrisearch Analytical Pty Ltd is presented in the laboratory report presented in the Appendices.

3 GLP compliance statement

.....(sign and date)
Study Director
Ian Ridley

The signature presented above indicates that the study DPINSW/GLP/11/01 was conducted in compliance with the OECD Principles of Good Laboratory Practice. All data (original and derived) relating to the study have been obtained according to the procedures described in this report and to the appropriate Standard Operating Procedures. The report provides an accurate record of the results obtained.

In signing this document the Study Director accepts the responsibility for the overall conduct of the study.

The following data were not collected under the OECD Principles of Good Laboratory Practice:

Climate data

4 Summary

This study was conducted to determine the buparvaquone tissue residue profile following intramuscular administration of BUTALEX at the maximum label rate to beef cattle. The study consisted of one field site at the Agrisearch Services Pty Ltd Springside Research Facility at Orange in New South Wales, Australia.

This tissue residue study involved seventy-two (72) treated cattle and two (2) untreated control cattle in store condition. This allowed for the two untreated animals to be sampled and for 12 sampling times with 6 animals each time for all remaining animals that were treated at the same concentration. The animals were housed outdoors before and after treatment in accordance with normal agricultural practice in commercial sized paddocks consisting of native and improved pastures with stock proof fences and adequate shade available. From 1 day pre-treatment (-3DAT) until the first sampling was conducted at Day 6, the remaining untreated animal was housed separately in the cattle yards and provided with lucerne hay during this period. Water was available *ad libitum* at all times.

Each of the animals in Treatment Group 2 was restrained in a head crush and with a metal ring and rope halter. The Test Item was then administered intramuscularly into the upper neck muscle approximately 20 cm down the spine from the atlas and axis joint at the request of the Study Sponsor. Injection sites were shaved and then swabbed with methylated spirits immediately prior to treatment to remove any dirt or faecal material from the proposed injection site.

The Test Item was administered at a dose rate of 5 mL/100 kg bodyweight on Day -2 and Day 0. Prior to administration the test item was inverted 10 times to ensure that adequate mixing of the product occurred prior to treatment. Individual animals were weighed and dosed to their individual body weight. Doses were rounded up to the next 0.2 mL increment when rounding was required but did not exceed 10 mL per injection. As in all cases the dose required was greater than 10 mL (animals greater than 200 kg) the dose for each treatment day was split in half and two injections were placed in the same side of the neck approximately 25mm apart on both Day -2 and Day 0.

Tissue sampling was conducted according to the schedule presented below:

Sampling Treatment Group	Number of Animals	Interval Between Treatment of Group 2 and Sampling (Days)
1. Untreated	2	6*
2.1 BUTALEX	6	7
2.2 BUTALEX	6	14
2.3 BUTALEX	6	28
2.4 BUTALEX	6	42
2.5 BUTALEX	6	56
2.6 BUTALEX	6	70
2.7 BUTALEX	6	84
2.8 BUTALEX	6	98
2.9 BUTALEX	6	119
2.10 BUTALEX	6	147
2.11 BUTALEX	6	175
2.12 BUTALEX	6	203

*Note that the untreated control animal W1-1 was sampled early at 80 days prior to treatment as it was seriously injured. Refer to Amendment 1. The second untreated control animal was sampled at Day 6 post-treatment of Group 2.

Tissues were collected from six sites on every animal: neck muscle, subcutaneous back fat (within 100 mm of the dorsal midline; if there was insufficient fat for sampling on the back, the subcutaneous fat sample was supplemented from the brisket for the reserve sample and this noted in the sample collection records), skeletal muscle (tender loin region), liver, perirenal fat and kidney. Samples were chilled following collection and placed in the Test Facility GLP freezer within 5-6 hours of collection.

The untreated control animal W1-1 was sampled early at 80 days prior to treatment as it was seriously injured (Refer to Amendment 1). The second untreated control animal was processed first at the initial sampling time of 6 days post-treatment to avoid cross contamination from treated animals.

The first shipment of the primary specimens was packed and shipped to the Test Site analytical laboratory in a GLP freezer van as described in Agrisearch SOP AD019 on 14 October 2012. The final shipment was made on 14 January 2013. The shipments contained a Chain of Custody Form and Sample Summary Form identifying all the samples in the shipment. The temperature of the primary samples was monitored during transport to the analytical laboratory by a calibrated TinyTag temperature data logger.

Both the primary and the reserve tissue samples for the untreated control group animal were shipped to the Test Site analytical laboratory in the first shipment.

The carcasses of the slaughtered animals were used for pet food.

Buparvaquone residues were determined according to:

> *"Determination of Buparvaquone Residues in Bovine Tissues and Milk by HPLC/MS/MS", AATM-R-170, Revision 1, Agrisearch Analytical Pty Ltd, October 2011.*

Quantifiable residues of buparvaquone (>0.01 mg/kg) were found in all of the supplied samples of bovine tissue following application of BUTALEX (50mg/mL Buparvaquone) at 5 mL/100 kg via intramuscular injection on Day -2 and Day 0 for the liver, kidney and neck muscle (injection site) samples.

The range of residues found in the tissue samples at each sampling point are presented in the table below:

DAT	Buparvaquone mg/kg					
	Neck Muscle	Muscle	Liver	Kidney	Perirenal Fat	Back Fat
7	34.2 - 1159.0	0.010 - 0.017	1.25 - 1.49	0.29 - 0.34	0.085 - 0.16	0.091 - 0.15
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98	0.012 - 72.6	<LOD - 0.006*	0.061 - 0.25	0.013 - 0.068	<LOD - 0.007*	<LOD - 0.011
119	0.031 - 60.5	All <LOD	0.073 - 0.17	0.015 - 0.054	All <LOD	All <LOD
147	2.79 - 101.1	All <LOD	0.040 - 0.20	0.009* - 0.038	All <LOD	All <LOD

LOD = Limit of detection = 0.005 mg/kg
LOQ = Limit of quantitation = 0.01 mg/kg
DAT = Days After Treatment

Note: Results marked with * are between the LOD and LOQ, as the reported values are less than the LOQ, by definition, their accuracy and precision cannot be verified.

All bovine tissue samples for perirenal fat, back fat and muscle were below the limit of detection (0.005mg/kg) at 119 Days post-treatment. Only the kidneys were beginning to decrease below the quantifiable level at day 147 for one sample collected, all other samples in the kidneys, liver and neck muscle were above this level.

5 Introduction

This study was conducted to determine the buparvaquone tissue residue profile following intramuscular administration of BUTALEX at the maximum label rate to beef cattle. The study consisted of one field site at the Agrisearch Services Pty Ltd research facility at Springside Research Facility at Orange in New South Wales, Australia.

The study co-ordination was conducted by Agrisearch Services Pty Ltd at Orange and the analytical component was conducted at Agrisearch Analytical, Rozelle. The study was conducted under the OECD Principles of Good Laboratory Practice (GLP).

This report contains the experimental methods used and presents the results obtained.

6 Objectives

The objective of this study was to determine the buparvaquone tissue residue profile following intramuscular administration of BUTALEX at the maximum label rate to beef cattle.

The study was conducted in accordance with the following guidelines:

1. APVMA Residue Guideline No. 23 – Data Requirements for Animal Tissue Residue Trials.
2. APVMA Residue Guideline No. 16 – Injectable Veterinary Products.
3. APVMA Residue Guideline No. 26 - Veterinary Drug Residue Analytical Methods.
4. APVMA Residue Guideline No. 8 – Chemicals and Products.
5. APVMA Residue Guideline No. 11 - Reporting of Residue Trials.
6. EMEA CVMP Guideline on Injection Site Residues 13 April 2005

The study was conducted in compliance with the OECD Principles of Good Laboratory Practice (as revised in 1997).

7 Study dates

The field phase of the study commenced on 28 May 2012, when the first study related data was collected and was completed on 7 March 2013, when the final samples were collected.

The analytical phase of the study commenced on 14 October 2012, when the first frozen samples arrived at the laboratory and was completed on 15 May 2013, when the analytical report was signed by the Principal Investigator.

The study was completed when the Study Director signed this report.

Day	Date	Activity
Day -107	1 May 2012	Suitable cattle sourced and trucked to Springside Research Facility
Day -106 to -2	2 May 2012 to 14 August 2012	Acclimatised cattle
Day -86	22 May 2012	All cattle were drenched with Ivomec Eprinex Pour -On for worms - see concurrent treatments for more details.
Day - 80	28 May 2012	Animal W1-1 was humanely euthanased early following an accident as detailed in the adverse events section.
Day -56	21 June 2012	All cattle were tagged with a white identification tag in the left ear numbered 1 to 73.
Day -3	13 August 2012	Cattle were weighed and allocated with a coloured numbered ear tag in the right ear (see amendment 3)
Day -2	14 August 2012	All cattle treated except for the untreated animal which was maintained in a separate yard.
Day 0	16 August 2012	All cattle treated except for the untreated animal which was maintained in a separate yard.
Day 1	17 August 2012	All cattle were healthy at the 24 hour health check.
Day 6	22 August 2012	Residue samples collected from 1 untreated animal.
Day 7	23 August 2012	Residue samples collected from 6 cattle from Group Red 2.1. All samples were stored in the Agrisearch Freezer and all carcasses were collected to be used as dog food.
Day 14	30 August 2012	Residue samples collected from 6 cattle from Group Orange 2.2. All samples were stored in the Agrisearch Freezer and all carcasses were collected to be used as dog food.
Day 28	13 September 2012	Residue samples collected from 6 cattle from Group Yellow 2.3. All samples were stored in the Agrisearch Freezer and all carcasses were collected to be used as dog food.
Day 42	27 September 2012	Residue samples collected from 6 cattle, 5 from Group Green 2.4 and 1 animal from Group 2.10 (See deviation 2). All samples were stored in the Agrisearch Freezer and all carcasses were collected to be used as dog food.
Day 56	11 October 2012	Residue samples collected from 6 cattle from Group Blue 2.5. All samples were stored in the Agrisearch Freezer and all carcasses were collected to be used as dog food.
Day 60	15 October 2012	Samples sent to Agrisearch Analytical Pty Ltd for analysis (see amendment 6).

Cont...

Continued

Day	Date	Activity
Day 70	25 October 2012	Residue samples collected from 6 cattle from Group Pink 2.6. All samples were stored in the Agrisearch Freezer and all carcasses were collected to be used as dog food.
Day 84	8 November 2012	Residue samples collected from 6 cattle from Group Purple 2.7. All samples were stored in the Agrisearch Freezer and all carcasses were collected to be used as dog food.
Day 98	22 November 2012	Residue samples collected from 6 cattle from Group Red 2.8. All samples were stored in the Agrisearch Freezer and all carcasses were collected to be used as dog food.
Day 102	26 November 2012	Sent samples to Agrisearch Analytical Pty Ltd for analysis.
Day 119	13 December 2012	Residue samples collected from 6 cattle from Group Yellow 2.9. All samples were stored in the Agrisearch Freezer and all carcasses were collected to be used as dog food.
Day 123	17 December 2012	Sent samples to Agrisearch Analytical Pty Ltd for analysis.
Day 147	10 January 2013	Residue samples collected from 6 cattle from Group Green 2.10. All samples were stored in the Agrisearch Freezer and all carcasses were collected to be used as dog food.
Day 151	14 January 2013	Sent samples to Agrisearch Analytical Pty Ltd for analysis.
Day 175	7 February 2013	Residue samples collected from 5 cattle from Group Blue 2.11. All samples were stored in the Agrisearch Freezer and all carcasses were collected to be used as dog food. Samples were all stored in the Agrisearch Orange Freezer for Storage.
Day 203	6 March 2013	Residue samples collected from 6 cattle from Group Pink 2.12. All samples were stored in the Agrisearch Freezer and all carcasses were collected to be used as dog food. Samples were all stored in the Agrisearch Orange Freezer for Storage.

8 Test item identification and storage

8.1 Identification

The test item was as follows:

BUTALEX Injection - a solution containing 50 mg/mL buparvaquone as the active constituent (Chemical Abstract Number CAS: 88426-33-9). The batch number of the test item used was 1008108 with a date of manufacture of January 2011 and an expiry date of January 2014. The sample was supplied by MSD Animal Health ready to use and requiring no dilution.

8.2 Storage

Before and during the schedule of treatment applications, the test items were stored in accordance with the Agrisearch Services Pty Ltd Standard Operating Procedure AD018. The test items were stored at ambient temperature in the test item storage room at the premises of Agrisearch Services Pty Ltd at Orange.

9 Site details

The field component of the study was conducted at the Agrisearch Services Pty Ltd research facility at Springside, Orange in the central tablelands of NSW, Australia.

The animals were housed outdoors before and after treatment in accordance with normal agricultural practice in commercial sized paddocks consisting of native and improved pastures with stock proof fences and adequate shade available. From 1 day pre-treatment (-3DAT) until the first sampling was conducted at day 6, the remaining untreated animal was housed separately in the cattle yards and provided with lucerne hay during this period. Water was available *ad libitum* at all times.

9.1 Study Animals

Species	Bovine (Bos Taurus)
Breed	Angus Wagyu Cross
Number	74
Sex	Female
Age	8-9 months
Bodyweight Range	200-300 kg
Condition	Good

The Animal's were sourced from Funny Hill Pastoral Company at Binda, NSW and a signed statement was obtained from the owner that no animals had been treated with any product containing active ingredients of similar chemistry to the Test Item for at least 6 months prior to commencement of the study. All animals were in store condition and not showing any signs of ill health at the time of purchase.

9.2 Animal Welfare

The Study Plan was submitted to the Agrisearch Services Pty Ltd Animal Care and Ethics Committee (ACEC) for review. Written approval (Approval Number 1212) was obtained from the ACEC before commencement of the study. The study complied with the NSW animal welfare legislation and the current guidelines on animal research of the National Health & Medical Research Council.

10 Weather data

Australian Government
Bureau of Meteorology

Orange, New South Wales
May 2012 Daily Weather Observations
Most observations from Orange Airport, but some from Orange Agricultural Institute.

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Tu	2.8	17.1	0.2	1.6	7.6	NNW	24	13:09	10.5	87	3	NNE	9	1027.7	16.5	57		NW	11	1024.4
2	We	3.3	13.7	0	1.6	7.9	NNW	35	10:40	13.0	80	7	N	17	1024.8	11.4	99		N	11	1021.3
3	Th	6.5	11.6	2.4	1.0	1.9	WSW	26	14:24	8.0	83	2	WSW	11	1021.2	11.2	52		SW	15	1020.0
4	Fr	0.4	11.4	0	1.4	9.3	SSW	31	09:15	6.7	75	0	SSW	20	1021.6	10.7	55		SSW	19	1019.0
5	Sa	-0.8	12.5	0.2	2.0	9.3	SW	31	23:04	7.7	83	0	SSW	11	1018.2	11.8	60		SSW	19	1015.8
6	Su	-0.5	10.9	0	1.0	8.3	SW	28	13:31	6.1	95	1	SW	13	1018.2	9.7	65		WSW	17	1017.4
7	Mo	0.5	11.8	0	2.0	9.1	SW	31	12:58	7.8	84	6	SW	13	1019.5	11.0	64		SSW	13	1017.6
8	Tu	0.0	16.8	0	1.4	5.2	SW	22	10:42	11.2	71	1	SSW	15	1021.0	16.3	36		WSW	11	1019.2
9	We	0.7	20.7	0	1.4	9.2	W	24	13:52	14.8	55	0	SW	13	1024.8	19.8	36		W	11	1023.1
10	Th	3.5	20.4	0	3.4	9.3	NW	31	10:41	15.7	48	0	NNW	9	1025.9	20.1	37		NW	17	1022.9
11	Fr	4.9	20.1	0	3.4	9.5	NW	44	10:36	14.1	52	4	NNW	22	1021.9	18.8	38		WNW	22	1018.4
12	Sa	5.2	10.4	0	2.6	8.9	SSW	35	11:44	7.8	73	1	SW	17	1019.5	9.1	52		SW	20	1017.3
13	Su	1.9	6.6	0	4.0	9.3	WSW	56	14:19	4.4	87	4	WSW	20	1016.6	6.4	97		WSW	26	1015.4
14	Mo	-0.6	11.0	1.2	1.2	2.6	SW	33	03:17	4.3	98	0	S	4	1021.4	10.1	53		SSW	11	1021.6
15	Tu	-2.7	12.1	0.2	1.8	9.0	S	24	12:29	6.8	82	0	S	15	1025.2	11.3	54		SW	15	1023.0
16	We	-2.6	14.8	0	1.4	9.2	NNE	17	09:59	8.2	91	0	ENE	2	1025.5	13.3	54		SSW	7	1022.8
17	Th	-3.1	15.0	0.2	2.2	9.3	WNW	17	13:38	8.6	100	0	Calm	Calm	1025.4	14.0	47		W	6	1022.7
18	Fr	-2.9	15.7	0	2.0	9.5	NNW	20	13:43	10.3	76	0	Calm	Calm	1025.9	15.2	32		NNW	15	1023.1
19	Sa	-2.9	13.7	0	1.0		SW	28	13:53	9.7	67	3	SW	6	1024.9	13.0	43		SSW	15	1022.9
20	Su	-1.9	14.4	0		7.5	S	17	13:16	9.8	74		ESE	2	1026.1	12.1	54		WSW	9	1023.6
21	Mo	-2.6	14.1	0	1.0	6.9	WSW	22	14:23	8.2	95	3	NNE	6	1025.7	11.8	59		SW	13	1023.0
22	Tu	-1.1	12.0	0	1.4	7.8	SW	35	12:20	8.4	67	0	SW	7	1025.8	11.4	49		SW	19	1023.5
23	We	2.1	15.2	0	2.4	7.8	NW	35	13:22	9.6	62	0	N	13	1025.7	14.4	35		NW	22	1022.3
24	Th	-0.7	11.2	0	1.0	7.9	N	56	16:56	9.6	78	8	NNE	17	1020.8	9.6	100		NNE	24	1016.0
25	Fr	4.4	7.8	50.4	7.6	1.2	NNW	59	09:36	4.8	95	5	NNW	33	1013.8	4.8	86		WNW	31	1013.0
26	Sa	2.9	7.2	2.0	1.0	2.2	W	50	00:19	4.5	92	8	W	22	1016.5	6.7	95		W	22	1016.3
27	Su	2.1	9.6	3.6	0.4	1.4	SSW	30	11:20	6.0	99	3	S	17	1021.0	8.9	83		SSW	11	1020.4
28	Mo	-2.7	12.2	0.4	0.8	5.8	SSE	17	15:01	5.6	100	0	ESE	6	1026.7	11.9	57		SE	6	1025.4
29	Tu	0.5	13.5	0.2	0.2	9.2	E	28	10:44	8.6	97	2	E	17	1031.5	12.2	64		ENE	15	1030.6
30	We	-1.8	14.3	0	1.8	8.5	ENE	26	10:42	8.1	100	1	ENE	6	1034.7	12.8	63		NE	13	1032.2
31	Th	0.8	12.4	0.2	0.8	7.7	NE	33	11:44	7.4	96	0	ENE	13	1033.4	12.0	59		ENE	11	1030.3
Statistics for May 2012																					
	Mean	0.5	13.2		1.8	7.3				8.6	82	2		12	1023.6	12.2	59			15	1021.4
	Lowest	-3.1	6.6		0.2	1.2				4.3	48	0		Calm	1013.8	4.8	32		#	6	1013.0
	Highest	6.5	20.7	50.4	7.6	9.5	NNW	59		15.7	100	8	NNW	33	1034.7	20.1	100		WNW	31	1032.2
	Total			61.2	54.8	218.3															

Temperature, humidity, wind, pressure and rainfall observations are from Orange Airport AWS {station 063303}. Cloud, evaporation and sunshine observations are from Orange Agricultural Institute {station 063254}

IDCJDW2105.201205 Prepared at 13:01 UTC on 9 Feb 2013

Orange, New South Wales
June 2012 Daily Weather Observations

Most observations from Orange Airport, but some from Orange Agricultural Institute.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Fr	1.3	12.6	0.2	2.0	7.4	NE	22	14:51	7.8	100	8	NE	13	1030.4	11.5	76		NE	15	1026.7
2	Sa	6.6	9.6	0.2	0.6	0.6	NE	26	14:15	9.3	99	8	NE	7	1023.4	9.2	99		NE	19	1019.3
3	Su	7.6	13.3	6.8	0.2	0.0	E	17	14:42	9.0	100	8	ESE	6	1015.6	11.9	92		ENE	13	1011.7
4	Mo	7.4	7.9	1.6	1.2	0.7	WSW	39	15:15	7.5	100	8	SW	13	1008.2	6.6	83		WSW	20	1006.1
5	Tu	2.6	5.5	0.6	0.8	1.2	S	50	20:46	2.9	99	8	NW	22	1002.1	4.1	99		SW	17	1005.4
6	We	2.8	8.6	3.6	2.0	0.7	SSE	46	05:31	5.3	90	8	SSE	30	1017.9	7.4	74		SSE	22	1019.5
7	Th	-1.8	9.7	0.2	0.2	2.6	SW	28	13:33	1.5	99	6	SE	15	1024.4	8.9	58		SW	15	1022.8
8	Fr	-5.8	11.2	0.2	1.0	7.3	NNW	22	11:20	4.1	99	0		Calm	1026.1	9.9	49		SW	13	1024.6
9	Sa	-5.1	11.9	0	1.6	8.8	N	24	11:55	4.3	99	0	ENE	4	1026.7	10.2	53		SSW	9	1024.8
10	Su	-4.4	10.4	0.2	1.2	8.4	ENE	28	11:21	4.7	99	0	ENE	7	1026.5	9.1	59		ENE	13	1023.3
11	Mo	1.4	11.4	0	2.0	7.5	ESE	41	12:12	6.9	97	7	E	15	1023.2	9.4	73		ESE	24	1021.0
12	Tu	3.2	12.4	0	1.0	3.0	ESE	37	10:44	8.7	88	6	ESE	19	1021.4	10.9	65		ESE	20	1020.4
13	We	0.6	13.3	0	0.6	4.6	E	30	09:33	8.7	91	4	E	22	1022.4	11.3	62		SE	7	1020.0
14	Th	2.2	13.2	0	2.2	5.0	NE	31	01:29	8.4	93	1	NE	13	1020.3	11.9	60		N	13	1017.0
15	Fr	4.8	13.6	0	2.6	7.1	NNW	43	10:35	9.1	82	7	NNW	22	1018.8	13.3	60		NNW	22	1016.1
16	Sa	5.1	8.3	8.6	1.2	4.4	NNW	48	12:44	6.4	99	8	ENE	13	1018.9	8.2	100		NW	31	1015.1
17	Su	4.1	8.2	26.6	1.4	0.1	SW	46	23:02	5.6	95	7	WSW	13	1022.6	7.1	89		W	22	1021.9
18	Mo	3.4	7.3	0.6	1.4	0.0	SW	43	18:46	5.4	98	7	SSW	22	1024.7	6.7	86		SW	19	1023.4
19	Tu	4.1	7.8	0.4	0.6	2.5	SW	39	08:10	6.0	99	8	WSW	17	1023.8	7.3	94		WSW	19	1022.1
20	We	-4.4	11.4	0.6	0.7	2.0	NNW	24	21:55	1.6	99	3		Calm	1023.1	10.3	47		NNW	13	1020.3
21	Th	-2.6	10.8	0.2	0.8	7.9	N	50	13:25	5.3	99	4	NW	24	1018.0	9.5	69		NNW	30	1013.5
22	Fr	3.4	6.8	7.4	4.0	8.0	NW	61	08:29	4.7	99	8	NNW	30	1009.6	5.3	89		WNW	20	1010.3
23	Sa	1.1	5.7	10.2	0.0	8.0	SW	35	18:01	2.2	96	3	WSW	20	1023.9	4.5	77		SW	20	1024.3
24	Su	0.8	7.4	0	4.0	8.4	SSW	52	04:59	3.8	89	8	SW	30	1030.9	6.6	75		SSW	24	1030.2
25	Mo	2.6	8.4	0	0.4	3.8	SSW	43	14:47	5.0	95	3	SSW	22	1030.7	7.0	82		SW	26	1028.3
26	Tu	-0.9	11.2	0	1.4	6.8	NNE	35	12:47	4.6	100	3	ENE	7	1029.7	9.8	66		NE	22	1028.3
27	We	4.6	11.5	0	1.2	7.8	ENE	31	00:59	6.7	92	4	ENE	15	1031.1	9.6	68		ENE	17	1027.8
28	Th	0.9	12.6	0	0.6	7.2	NE	30	16:41	6.9	92	3	NE	9	1026.1	10.5	69		ENE	22	1020.9
29	Fr	2.8	12.6	0	1.9	7.9	NW	39	14:59	7.1	100	5	N	13	1017.2	11.0	67		NW	22	1013.5
30	Sa	0.2	10.6	0	1.2	2.6	W	35	12:23	6.5	92	1	NE	6	1015.0	9.2	58		WNW	20	1013.9
Statistics for June 2012																					
Mean		1.6	10.2		1.3	4.7				5.9	95	5		14	1021.8	8.9	73			18	1019.8
Lowest		-5.8	5.5		0.0	0.0				1.5	82	0		Calm	1002.1	4.1	47		SE	7	1005.4
Highest		7.6	13.6	26.6	4.0	8.8	NW	61		9.3	100	8	#	30	1031.1	13.3	100		NW	31	1030.2
Total				68.2	40.0	142.3															

Temperature, humidity, wind, pressure and rainfall observations are from Orange Airport AWS {station 063303}. Cloud, evaporation and sunshine observations are from Orange Agricultural Institute {station 063254}

IDCJDW2105.201206 Prepared at 13:01 UTC on 8 Feb 2013

Orange, New South Wales
July 2012 Daily Weather Observations

Most observations from Orange Airport, but some from Orange Agricultural Institute.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Su	3.2	6.7	0	1.8	4.3	WSW	43	23:58	4.1	85	7	W	13	1017.6	5.1	81		WNW	17	1016.0
2	Mo	0.9	4.5	8.0	1.0	3.2	WSW	52	01:46	2.6	99	8	WSW	22	1019.3	3.8	99		WSW	20	1019.5
3	Tu	2.2	6.0	2.8	0.2	1.0	SW	41	11:52	2.9	99	7	SW	19	1022.3	4.9	86		SW	22	1020.6
4	We	-4.2	8.3	0	0.3	8.0	S	30	09:47	2.3	99	0	SSE	15	1026.6	7.5	56		SSE	13	1026.7
5	Th	-2.0	9.4	0	0.8	9.1	SE	28	12:01	3.6	90	0	SSE	17	1032.5	7.6	64		SE	13	1031.2
6	Fr	-0.5	10.7	0.2	2.0	8.6	E	33	10:22	5.2	87	1	ESE	20	1033.9	9.8	53		ESE	11	1031.5
7	Sa	-5.1	10.6	0	0.6	8.0	ENE	24	10:44	4.8	89	0		Calm	1033.2	9.7	52		N	7	1030.8
8	Su	-1.0	12.4	0.4	1.6	8.2	NW	30	12:07	5.6	99	0	NE	11	1031.7	11.8	51		NW	9	1029.0
9	Mo	-0.5	13.3	0.2	1.3	7.5	NNE	33	14:18	5.3	99	5	N	9	1031.0	12.3	59		NE	19	1026.5
10	Tu	2.2	9.9	0	1.6	7.5	N	46	11:27	7.6	90	8	NE	20	1025.3	9.8	82		NNE	30	1020.5
11	We	3.4	10.9	34.8	1.2	0.0	NNW	33	11:09	6.7	100	8	NNW	20	1022.4	10.2	72		NNW	15	1021.0
12	Th	3.7	11.8	1.6	0.2	5.8	NNW	56	15:06	8.7	100	8	NE	13	1018.5	10.9	100		N	37	1014.0
13	Fr	7.8	14.4	14.8	0.4	0.0	NW	48	05:15	11.6	100	8	NNW	20	1014.8	13.1	64		NW	30	1011.9
14	Sa	5.6	9.4	2.2	0.0	4.8	NW	48	13:11	7.6	94	7	NW	19	1015.6	8.6	64		NW	30	1013.7
15	Su	2.1	5.5	1.0	1.4	6.5	WSW	44	06:34	2.6	99	8	WSW	24	1020.9	2.6	99		W	19	1022.4
16	Mo	1.9	10.0	0.4	1.6	4.4	WSW	30	01:51	5.5	99	8	SSW	2	1030.5	9.7	79		SSW	15	1027.8
17	Tu	-0.9	11.5	3.2	1.6	9.1	N	37	11:45	5.9	95	8	N	22	1027.6	11.0	54		NNW	20	1024.4
18	We	0.5	10.2	1.8	1.2	8.3	WSW	37	12:08	7.0	88	0	NNW	15	1022.2	9.9	59		WSW	17	1019.2
19	Th	-1.2	7.0	0.4	2.0	8.7	SSW	31	11:22	2.4	99	0	SW	17	1022.2	6.5	68		SW	20	1021.8
20	Fr	-0.8	10.2	0.2	2.4	9.4	SSW	35	09:27	3.2	92	0	SSW	22	1026.9	9.7	60		SSW	15	1026.0
21	Sa	-0.2	10.7	0.2	0.2	9.1	ESE	35	10:15	5.6	88	0	SSE	17	1031.5	10.1	57		S	19	1029.5
22	Su	-1.0	11.0	0.2	1.8	9.0	SE	33	14:19	5.8	92	0	SE	13	1030.7	9.8	60		ESE	15	1029.3
23	Mo	-1.0	10.1	0	1.6	7.1	ESE	35	12:37	5.2	97	6	ESE	9	1030.4	9.4	67		E	19	1028.0
24	Tu	2.5	12.6	0	2.2	3.9	NE	30	00:19	6.9	83	7	NE	17		12.3	60		ENE	17	
25	We	-1.5	11.6	0.2	1.0	7.5	NNW	43	12:55	6.1	99	0	NE	9		9.9	64		NNW	24	1021.4
26	Th	5.1	13.0	1.0	1.6	7.2	NNW	44	06:45	7.3	98	3	N	15	1016.7	11.1	75		NNW	22	1012.2
27	Fr	-0.8	7.5	0.6	2.4	5.8	WNW	35	12:33	5.5	74	3	W	13	1014.4	5.7	84		WNW	19	1013.0
28	Sa	1.7	5.5	5.0	2.0	3.1	SW	41	12:29	3.3	99	8	SSW	22	1019.8	5.4	96		WSW	17	1020.3
29	Su	3.3	8.1	0.4	0.6	1.6	SW	35	01:29	4.5	99	8	SW	17	1024.6	7.1	75		WSW	20	1023.7
30	Mo	-3.1	8.1	0.2	1.6	7.3	S	37	12:48	3.1	83	0	S	15	1026.4	7.1	57		SSW	26	1023.9
31	Tu	-2.3	9.0	0.2	1.2	7.9	SE	28	10:01	3.0	84	0	SE	13	1027.4	8.4	53		SSW	13	1023.8
Statistics for July 2012																					
Mean		0.6	9.7		1.3	6.2				5.2	93	4		15	1024.7	8.7	69			19	1022.7
Lowest		-5.1	4.5		0.0	0.0				2.3	74	0		Calm	1014.4	2.6	51		N	7	1011.9
Highest		7.8	14.4	34.8	2.4	9.4	NNW	56		11.6	100	8	WSW	24	1033.9	13.1	100		N	37	1031.5
Total				80.0	39.4	191.9															

Temperature, humidity, wind, pressure and rainfall observations are from Orange Airport AWS {station 063303}. Cloud, evaporation and sunshine observations are from Orange Agricultural Institute {station 063254}

Orange, New South Wales
August 2012 Daily Weather Observations

Most observations from Orange Airport, but some from Orange Agricultural Institute.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	We	-4.2	8.6	0	0.5	8.8	SSW	35	13:28	3.4	87	4		Calm	1023.4	6.3	59		S	19	1021.3
2	Th	-4.0	9.1	0.2	0.4	5.6	SW	28	15:03	4.1	88	0	SSW	13	1023.2	8.4	42		SW	15	1020.2
3	Fr	-2.6	9.6	0	1.8	8.2	W	35	09:59	6.4	67	0	WNW	17	1019.5	9.3	53		WSW	20	1017.6
4	Sa	1.9	11.4	0	2.6	9.1	SW	46	12:06	8.5	65	1	W	20	1020.2	10.5	46		W	24	1018.3
5	Su	1.3	13.0	0	2.0	9.2	WNW	50	12:26	9.5	56	1	NW	20	1018.5	10.0	63		WSW	15	1016.0
6	Mo	2.9	6.7	1.2	3.0	6.3	WSW	50	10:11	4.0	77	3	WSW	24	1019.1	5.4	67		WSW	24	1019.9
7	Tu	-3.2	9.0	0	2.0	8.8	SW	33	00:36	2.6	90	0	S	15	1025.7	8.4	51		SW	15	1024.2
8	We	-3.7	12.2	0	1.6	8.2	NW	33	23:36	6.8	65	0		Calm	1024.2	11.6	47		NW	19	1020.0
9	Th	3.9	8.2	0.8	3.2	8.8	SW	63	19:48	5.3	99	7	SW	15	1017.7	5.9	71		WSW	30	1016.1
10	Fr	-1.0	6.2	2.6	2.8	8.8	WSW	54	01:00	-0.1	99	3	SW	31	1019.9	5.7	72		SW	30	1020.5
11	Sa	-0.4	9.7	0.2	2.4	7.9	S	43	10:18	4.6	82	0	S	24	1024.0	8.7	61		SSW	22	1022.8
12	Su	0.1	10.2	0	2.6	9.2	SE	31	09:12	4.3	80	0	SE	19	1026.4	9.9	45		E	11	1024.8
13	Mo	-2.8	11.8	0.2	2.0	9.3	SSW	22	12:31	4.7	86	0	NNE	9	1028.2	10.8	55		SSW	13	1024.9
14	Tu	-4.1	12.5	0	1.9	9.3	WSW	37	14:53	7.4	69	7		Calm	1023.9	11.0	47		W	22	1020.8
15	We	2.1	15.1	0	2.0	7.2	WNW	50	12:39	9.0	55	2	NW	28	1019.1	14.3	35		NW	33	1015.4
16	Th	-1.1	11.3	0	2.2	7.6	NW	31	15:10	6.2	81	2	SSW	13	1016.6	11.0	51		WNW	13	1013.7
17	Fr	1.3	7.8	0	2.4	6.6	WNW	54	14:32	7.0	61	5	NNW	33	1007.9	4.6	81		WNW	28	1007.0
18	Sa	0.2	5.6	9.0	1.0	4.7	W	43	11:16	3.3	99	8	WNW	20	1011.4	4.3	99		W	22	1013.7
19	Su	2.6	7.7	13.2	2.8	1.5	SW	37	00:22	4.2	95	1	SW	20	1022.4	6.8	74		WSW	13	1022.4
20	Mo	-4.2	10.4	0.2	1.0	9.8	NW	26	11:23	3.5	94	6	NE	11	1023.9	10.0	49		N	7	1019.7
21	Tu	-1.1	13.5	0	0.4	9.7	N	37	11:07	7.7	60	2	N	2	1021.7	12.9	40		N	19	1017.9
22	We	2.3	16.8	0	1.2	8.0	N	50	13:26	10.4	88	6	N	20	1017.5	16.2	58		N	33	1012.2
23	Th	10.3	16.4	0.8	2.8	7.2	NW	63	22:46	13.1	84	8	N	24	1012.9	9.2	99		WSW	28	1011.7
24	Fr	1.5	10.4	1.6	2.6	1.6	NW	54	13:37	4.6	73	2	W	17	1018.4	9.1	53		NW	35	1016.3
25	Sa	3.4	9.2	1.2	3.2	8.6	WSW	37	00:33	5.5	80	5	WSW	9	1021.2	7.4	66		W	20	1019.4
26	Su	1.2	7.8	0.8	2.0	7.5	SW	41	08:54	6.1	75	6	SW	28	1020.5	6.9	81		WSW	19	1020.5
27	Mo	-3.1	13.2	0.4	1.4	2.2	N	31	11:13	6.8	77	0	NNE	15	1025.4	12.3	33			Calm	1023.1
28	Tu	-2.4	13.7	0	2.4	8.5	NNW	24	15:43	7.0	84	5		Calm	1025.3	12.7	41		NW	9	1021.8
29	We	1.3	16.8	0.2	2.8	9.2	NNW	56	09:45	9.3	70	5	NNW	28	1019.3	15.0	45		NNW	30	1013.2
30	Th	5.3	9.4	0	3.2	5.1	WNW	46	12:32	7.2	74	3	WSW	26	1014.9	8.0	58		W	26	1015.4
31	Fr	-0.2	7.3	0	2.8	8.2	WNW	44	12:15	3.8	76	1	W	19	1019.4	6.4	62		W	24	1017.4
Statistics for August 2012																					
Mean		0.1	10.7		2.1	7.4				6.0	78	3		16	1020.4	9.3	58			20	1018.3
Lowest		-4.2	5.6		0.4	1.5				-0.1	55	0		Calm	1007.9	4.3	33			Calm	1007.0
Highest		10.3	16.8	13.2	3.2	9.8	#	63		13.1	99	8	NNW	33	1028.2	16.2	99		NW	35	1024.9
Total				32.6	65.0	230.7															

Temperature, humidity, wind, pressure and rainfall observations are from Orange Airport AWS {station 063303}. Cloud, evaporation and sunshine observations are from Orange Agricultural Institute {station 063254}

Orange, New South Wales
October 2012 Daily Weather Observations

Most observations from Orange Airport, but some from Orange Agricultural Institute.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Mo	-2.6	13.9	0	4.0	10.4	SW	28	15:35	8.5	74	3	NE	13	1026.4	13.3	53		SSW	17	1025.1
2	Tu	2.5	17.3	0	3.0	10.9	NE	19	07:40	10.7	74	0	E	9	1031.7	17.1	37		SSW	6	1028.4
3	We	2.5	19.7	0	4.0	11.4	SW	30	14:16	15.9	48	0	SW	6	1028.1	19.6	43		WSW	15	1024.7
4	Th	4.1	21.3	0	6.2	11.4	NW	48	14:45	17.2	51	0	NW	24	1022.8	21.2	35		WNW	24	1019.2
5	Fr	8.8	25.0	0	6.4	8.7	WNW	52	13:02	19.7	42	0	NNW	24	1019.6	24.4	27		W	26	1017.2
6	Sa	13.0	24.1	0	4.0	9.8	SW	67	22:34	17.2	54	7	W	13	1017.7	23.1	44		NNW	28	1010.5
7	Su	3.7	13.1	0	5.6	7.5	SW	54	00:11	5.4	90	2	SSW	28	1013.9	12.4	48		SW	24	1014.2
8	Mo	-1.2	14.7	0.2	3.0	11.8	N	33	11:29	6.4	95	4	NE	17	1014.7	13.6	49		NW	19	1011.5
9	Tu	1.1	13.1	0	3.4	10.0	SW	41	11:40	8.5	59	4	SW	19	1011.5	12.3	49		WSW	20	1010.2
10	We	1.2	14.9	0	5.0	10.0	SW	28	14:37	8.8	63	0	SW	13	1011.5	14.1	44		SSW	13	1008.8
11	Th	2.7	10.5	2.4	4.4	9.9	WNW	41	14:11	4.7	99	3	S	17	1004.8	7.4	68		WNW	24	1004.4
12	Fr	0.1	10.8	5.8	3.2	5.3	SW	56	12:26	0.3	99	8	SW	24	1009.1	9.8	78		SW	30	1013.2
13	Sa	0.3	12.3	3.6	0.6	7.0	SSW	35	14:09	5.8	77	1	SW	19	1019.2	11.8	63		SW	22	1019.2
14	Su	0.6	15.8	0	4.6	11.3	ESE	24	11:53	9.6	61	4		Calm	1024.5	14.9	43		NW	6	1023.2
15	Mo	1.8	20.1	0	4.0	11.3	SW	26	14:00	12.8	67	0		Calm	1025.7	19.3	33		WSW	15	1023.9
16	Tu	7.9	22.8	0	5.2	11.4	NW	50	13:52	16.5	38	4	NNW	30	1022.2	22.3	35		NW	35	1018.8
17	We	8.7	17.5	0	7.2	11.6	WNW	44	01:44	13.1	59	0	SW	19	1018.4	16.5	27		SW	20	1018.4
18	Th	3.2	21.7	0	4.0	11.6	NE	28	07:57	10.9	82	0	NE	22	1020.9	20.9	39		NNW	11	1018.4
19	Fr	8.4	25.9	0	4.0	10.6	NW	44	14:47	19.1	40	5	N	17	1017.8	25.0	33		NNW	24	1014.5
20	Sa	12.7	22.5	0	6.0	10.2	WSW	46	11:26	19.5	40	0	WSW	22	1013.8	21.7	32		WSW	28	1014.1
21	Su	7.5	17.5	0.4	8.2	11.3	W	61	08:15	14.4	63	8	WNW	28	1017.2	16.1	54		WSW	22	1015.4
22	Mo	1.9	13.5	1.8	4.4	5.7	SSE	46	17:02	8.1	61	0	SSW	22	1016.1	12.3	36		S	28	1017.9
23	Tu	2.2	17.2	0	6.0	12.3	E	54	06:14	7.7	65	1	E	30	1024.5	16.7	41		ENE	19	1023.3
24	We	1.7	21.3	0	4.0	11.6	N	26	09:31	10.4	70	3	NE	13	1023.4	20.7	37		NNW	13	1019.0
25	Th	5.6	24.7	0	2.4	11.1	NW	54	14:16	17.6	44	0	NNW	22	1015.6	23.9	26		WNW	35	1012.2
26	Fr	4.7	15.9	0	7.6	10.9	W	37	13:56	11.5	80	8	SSW	9	1010.7	14.8	48		W	24	1010.3
27	Sa	1.8	16.0	0	4.0	11.8	SW	33	07:45	8.5	64	1	SSW	20	1015.6	15.0	29		SSW	19	1016.1
28	Su	3.1	17.9	0	4.0	6.7	E	37	07:47	10.0	77	2	ENE	26	1023.1	16.9	45		N	15	1021.7
29	Mo	3.6	19.1	0	6.6	8.6	N	30	09:55	10.1	80	6	NNE	17	1023.6	18.6	52		NNE	7	1020.5
30	Tu	9.1	20.9	0	2.2	7.2	S	31	12:45	14.5	74	8	N	9	1019.9	20.1	41		SW	17	1017.1
31	We	8.5	24.7	0	3.0	9.1	SW	31	11:16	18.7	58	0		Calm	1019.2	23.3	29		SSW	17	1016.9
Statistics for October 2012																					
Mean		4.2	18.2		4.5	9.9				11.7	66	2		17	1018.8	17.4	42			20	1017.0
Lowest		-2.6	10.5		0.6	5.3				0.3	38	0		Calm	1004.8	7.4	26		#	6	1004.4
Highest		13.0	25.9	5.8	8.2	12.3	SW	67		19.7	99	8	#	30	1031.7	25.0	78		#	35	1028.4
Total				14.2	140.2	308.4															

Temperature, humidity, wind, pressure and rainfall observations are from Orange Airport AWS {station 063303}. Cloud, evaporation and sunshine observations are from Orange Agricultural Institute {station 063254}

Orange, New South Wales
November 2012 Daily Weather Observations

Most observations from Orange Airport, but some from Orange Agricultural Institute.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Th	12.3	24.0	0	8.0	11.3	NNW	54	08:17	20.7	41	5	NNW	37	1011.2	16.2	64		SW	26	1008.0
2	Fr	1.0	18.6	0	2.4	4.4	SW	39	01:21	10.5	51	0	S	15	1012.8	18.0	37		SW	17	1012.3
3	Sa	5.7	15.6	0	6.6	11.6	NE	35	09:51	10.1	79	8	ENE	19	1017.4	14.6	60		ENE	19	1016.4
4	Su	7.1	22.4	0	2.2	3.6	NNW	31	10:40	13.0	77	2	N	15	1018.7	20.8	48		NW	15	1016.6
5	Mo	9.3	27.1	0	4.8	10.0	NNW	35	08:27	19.5	60	2	NNW	26	1019.6	25.4	35		WNW	13	1016.9
6	Tu	12.9	25.4	0	7.2	9.1	NNW	46	10:15	22.5	47	6	N	26	1017.0	22.5	46		NW	22	1016.1
7	We	13.7	20.2	1.0	4.6	3.6	N	48	14:02	15.8	99	8	N	9	1015.2	19.1	68		N	33	1011.1
8	Th	12.6	20.4	6.8	2.2	2.2	SW	30	14:18	15.8	94	6	NW	9	1012.9	20.1	54		SSW	17	1013.2
9	Fr	7.7	19.7	0	3.4	10.1	SW	46	14:27	16.8	68	6	WSW	11	1016.1	19.1	37		SW	24	1015.9
10	Sa	2.7	19.5	0	6.4	11.2	E	46	18:28	12.1	47	7	SSE	13	1020.3	18.1	30		S	9	1018.9
11	Su	3.3	19.1	0	5.2	12.7	ENE	35	07:56	10.3	63	0	ENE	26	1025.1	18.2	32		ENE	13	1022.4
12	Mo	5.1	23.3	0	6.8	12.9	NNW	37	11:08	13.7	66	0	N	15	1024.0	22.4	38		NW	19	1020.4
13	Tu	10.7	25.7	0	5.4	10.6	NW	56	09:52	20.3	43	0	NW	31	1019.4	25.6	33		W	26	1017.3
14	We	10.1	22.7	0	9.6	11.0	WNW	37	11:08	13.1	93	3	NNE	9	1017.1	20.7	21		W	19	1014.7
15	Th	4.9	23.4	0	5.6	9.5	WSW	31	15:40	14.2	92	2	N	13	1014.6	22.6	27		W	15	1012.5
16	Fr	9.7	15.9	5.0	6.4	8.4	SSW	44	23:36	11.6	99	8	NW	11	1010.9	15.4	79		NW	9	1009.7
17	Sa	3.9	19.8	0	1.6	5.2	ENE	30	07:55	11.6	85	7	ENE	22	1013.7	19.3	48		NW	9	1011.6
18	Su	5.2	21.0	0	4.0	12.0	W	48	14:36	13.8	78	1	NNW	9	1011.8	20.6	24		W	26	1009.4
19	Mo	1.7	17.9	0	8.0	12.1	SSE	52	15:38	11.1	52	1	S	19	1014.0	16.6	46		S	31	1014.1
20	Tu	5.4	20.8	0	4.0	12.0	E	54	07:22	12.7	66	2	E	33	1019.8	19.7	37		E	19	1018.6
21	We	5.4	25.2	0	8.0	12.3	NW	37	12:19	13.4	70	7	N	11	1017.4	24.0	34		W	19	1013.3
22	Th	9.3	25.7	0	6.2	11.1	NNW	33	12:26	17.6	61	3	ESE	15	1014.4	25.1	29		SW	19	1012.5
23	Fr	7.5	26.1	0	7.0	13.1	E	30	01:43	14.4	71	1	NE	15	1017.6	24.3	32		NE	13	1014.8
24	Sa	8.7	27.2	0	7.2	12.6	N	31	08:58	17.0	75	2	NNE	15	1017.7	26.1	40		NW	15	1014.7
25	Su	11.0	30.0	0	6.4	10.5	NNW	33	07:42	22.0	60	0	NNW	22	1017.6	28.7	29		NW	9	1016.0
26	Mo	14.1	30.8	0	8.2	7.7	NNW	43	09:57	24.5	51	7	NNW	26	1017.4	24.4	63		E	6	1015.2
27	Tu	17.0	24.9	0.6	4.9	1.1	NNW	50	08:40	21.4	66	7	NNW	30	1016.3	22.8	62		N	15	1015.2
28	We	12.0	29.2	0	4.4	7.4	WNW	57	16:05	21.2	68	6	N	7	1017.1	27.9	36		WNW	15	1014.2
29	Th	12.3	30.6	3.0	9.4	7.6	N	35	10:18	21.3	70	2	NNW	22	1016.5	30.5	42		NW	17	1014.6
30	Fr	17.9	32.3	0.2	5.2	10.0	WSW	48	19:58	24.3	61	3	N	15	1017.5	30.2	33		NNW	24	1015.1
Statistics for November 2012																					
Mean		8.7	23.5		5.7	9.2				16.2	68	3		18	1016.7	22.0	42			17	1014.7
Lowest		1.0	15.6		1.6	1.1				10.1	41	0	N	7	1010.9	14.6	21		E	6	1008.0
Highest		17.9	32.3	6.8	9.6	13.1	WNW	57		24.5	99	8	NNW	37	1025.1	30.5	79		N	33	1022.4
Total				16.6	171.3	276.9															

Temperature, humidity, wind, pressure and rainfall observations are from Orange Airport AWS {station 063303}. Cloud, evaporation and sunshine observations are from Orange Agricultural Institute {station 063254}

Orange, New South Wales
December 2012 Daily Weather Observations

Most observations from Orange Airport, but some from Orange Agricultural Institute.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Sa	18.2	29.7	2.2	5.2	6.5	WSW	46	04:42	20.3	94	8	ENE	13	1015.7	27.5	54		SSW	30	1015.1
2	Su	16.3	29.5	0	7.2	7.1	SW	39	15:09	23.8	57	8	N	7	1013.8	28.4	41		WSW	22	1012.3
3	Mo	13.2	26.5	0	8.0	13.6	WNW	44	12:38	18.8	74	7	NNW	13	1010.7	25.0	23		NW	26	1006.6
4	Tu	9.3	18.5	0	10.0	13.4	W	61	14:15	12.5	57	1	SW	31	1006.2	17.8	26		WSW	31	1005.8
5	We	7.2	16.8	0	8.8	12.7	SW	63	07:39	9.7	53	1	SW	37	1007.8	15.4	39		WSW	30	1008.7
6	Th	2.8	21.5	0	6.0	14.1	WSW	37	13:03	12.6	50	0	SSW	15	1015.3	20.4	28		SW	19	1015.7
7	Fr	5.9	23.2	0	7.0	14.1	N	28	15:38	13.7	72	6	NE	15	1020.6	20.1	43		NNE	13	1018.9
8	Sa	7.1	27.1	0	5.2	8.0	NW	31	13:23	19.1	62	1	N	22	1018.3	25.6	29		NW	13	1014.3
9	Su	10.5	31.2	0	6.4	8.6	W	44	13:10	24.1	43	1	N	17	1014.6	30.0	20		W	24	1013.1
10	Mo	9.2	21.7	0	10.6	11.9	E	44	12:06	15.1	68	2	E	30	1021.1	21.1	53		E	24	1020.8
11	Tu	8.5	23.0	0	5.8	12.8	ENE	43	17:28	13.5	76	3	ENE	19	1023.8	22.2	48		E	24	1021.7
12	We	11.0	24.6	0	6.0	13.0	NE	37	06:57	16.6	65	0	NE	26	1024.6	24.5	37		E	19	1021.6
13	Th	8.7	27.1	0	7.4	10.4	S	30	12:46	16.6	60	1	NNE	13	1021.7	25.4	24		S	11	1018.1
14	Fr	12.1	30.1	0	4.8	9.4	NNW	35	09:30	21.9	36	5	NNW	19	1015.8	27.7	26		N	11	1012.4
15	Sa	16.7	23.4	0	4.6	6.5	NNW	56	15:57	21.3	50	8	NE	11	1009.2	22.4	47		WNW	20	1008.4
16	Su	12.0	28.2	0.2	3.8	1.0	NW	48	09:41	21.0	48	5	NNW	20	1007.1	27.1	35		WSW	26	1005.3
17	Mo	10.5	25.1	0	7.4	10.3	SSW	33	12:34	18.9	56	6	W	2	1009.2	23.7	28		W	17	1007.7
18	Tu	7.2	26.4	0	8.0	13.1	SW	31	11:45	18.8	34	2	SW	13	1010.7	25.1	25		SW	15	1009.5
19	We	10.3	31.6	0	7.0	10.8	NNW	48	14:44	19.3	65	1	NE	17	1012.0	30.0	27		NW	20	1008.3
20	Th	19.2	27.3	0	10.8	10.0	WNW	43	04:20	21.5	39	8	SW	24	1010.0	25.9	35		W	26	1009.7
21	Fr	9.4	29.1	0	6.4	9.8	NE	43	17:39	16.7	70	0	ENE	24	1015.4	26.9	30		E	7	1012.2
22	Sa	12.5	30.1	0	8.0	12.0	E	35	19:03	18.3	78	2	NNE	19	1016.0	27.9	36		N	20	1013.2
23	Su	14.6	29.2	0	7.0	11.4	NNW	41	09:54	22.6	60	3	NNW	26	1016.7	26.9	43		NW	19	1014.1
24	Mo	15.2	32.6	0	7.0	5.7	SW	65	18:35	22.7	56	2	N	20	1014.9	30.6	31		WNW	28	1011.5
25	Tu	16.0	24.0	11.2	9.0	7.4	SW	41	11:45	19.2	91	6	NNE	13	1011.9	22.5	72		WSW	22	1009.0
26	We	10.5	19.6	16.6	7.2	5.0	E	43	18:26	13.7	80	7	ESE	28	1014.4	18.4	61		E	24	1013.5
27	Th	6.1	24.9	0	5.9	10.7	NW	31	12:24	12.7	71	7	NE	17	1015.2	23.7	26		NW	13	1012.2
28	Fr	10.7	27.2	0	7.0	13.5	NW	63	09:57	22.9	43	0	NW	31	1010.9	25.5	22		SW	28	1010.2
29	Sa	8.7	26.5	0	10.8	12.6	SW	43	14:51	16.1	75	0	N	11	1015.1	24.9	32		SSW	31	1014.4
30	Su	10.2	28.1	0	8.0	13.5	ENE	30	19:31	17.1	78	0	NE	17	1017.1	26.9	29		NW	13	1015.2
31	Mo	12.8	30.3	0	8.0	13.8	NW	54	11:38	19.1	67	0	NNE	17	1017.5	29.0	31		NNW	22	1014.5
Statistics for December 2012																					
Mean		11.1	26.3		7.2	10.4				18.1	62	3		18	1014.6	24.8	35			20	1012.7
Lowest		2.8	16.8		3.8	1.0				9.7	34	0	W	2	1006.2	15.4	20		E	7	1005.3
Highest		19.2	32.6	16.6	10.8	14.1	SW	65		24.1	94	8	SW	37	1024.6	30.6	72		#	31	1021.7
Total				30.2	224.3	322.7															

Temperature, humidity, wind, pressure and rainfall observations are from Orange Airport AWS {station 063303}. Cloud, evaporation and sunshine observations are from Orange Agricultural Institute {station 063254}

Orange, New South Wales
January 2013 Daily Weather Observations

Most observations from Orange Airport, but some from Orange Agricultural Institute.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Tu	13.8	31.4	0	8.0	13.9	WNW	65	13:00	24.5	37	0	NNW	35	1013.3	30.9	15		WNW	31	1010.9
2	We	12.2	29.8	0	14.6	11.5	SW	37	12:41	23.8	28	1	SSW	15	1011.6	29.5	18		SW	17	1010.6
3	Th	10.5	29.5	0	8.0	13.8	E	33	19:43	15.6	79	1	NE	20	1015.2	27.3	28		ESE	11	1012.6
4	Fr	12.4	32.4	0	8.0	13.7	NNE	37	08:44	22.4	31	0	ENE	24	1014.4	30.9	19		N	17	1012.2
5	Sa	16.9	35.5	0	10.8	13.2	ESE	41	17:02	27.0	40	0	N	24	1015.5	34.4	21		SSE	19	1014.6
6	Su	17.1	36.1	0	10.0	13.2	E	43	20:09	27.0	27	1	ENE	24	1019.1	35.2	12		ESE	15	1017.2
7	Mo	13.4	33.7	0	12.0	12.5	NNW	30	17:29	19.4	63	2	NNE	15	1020.7	31.9	18		NNE	9	1016.6
8	Tu	19.2	33.2	0	12.0	12.4	NNW	72	14:03	24.4	40	4	NNW	46	1009.8	31.1	24		NNW	44	1004.1
9	We	12.5	23.7	0.2	13.2	7.0	NW	56	23:08	15.0	48	0	SW	26	998.8	22.2	20		SW	26	999.8
10	Th	8.3	29.3	0	11.0	13.0	NE	39	07:17	15.5	73	3	NE	24	1006.4	26.6	30		NE	19	1005.5
11	Fr	12.9	34.4	0	7.2	11.0	NW	50	11:35	21.0	66	0	NNE	17	1008.7	32.4	21		NNW	20	1007.1
12	Sa	17.5	38.1	0	8.0	13.2	SSW	52	15:53	27.3	47	8	NNW	22	1010.8	35.6	15		W	20	1009.3
13	Su	21.1	35.1	0	15.2	10.1	SSW	57	16:09	29.0	41	4	WNW	20	1008.9	32.1	31		WSW	26	1004.9
14	Mo	8.1	24.8	1.2	8.6	8.4	E	46	20:26	15.2	75	1	ESE	11	1011.5	23.4	31		E	15	1011.5
15	Tu	8.6	27.9	0	10.8	13.0	NE	43	07:27	15.1	66	1	NE	33	1015.4	25.1	31		NNW	13	1013.0
16	We	12.7	31.4	0	8.0	13.0	W	44	12:58	21.9	60	2	N	22	1013.9	29.1	30		WSW	19	1011.7
17	Th	15.0	34.9	0	7.0	11.5	NW	48	11:07	23.2	44	0	N	15	1011.0	31.7	26		WNW	20	1007.8
18	Fr	19.4	36.7	0	10.2	10.6	WNW	61	13:49	29.4	33	1	NNW	35	1006.6	31.6	30		NNW	28	1004.6
19	Sa	18.5	25.5	0.4	9.8	7.3	E	33	21:43	21.5	63	6	N	11	1010.4	23.3	73		N	13	1010.1
20	Su	12.5	25.1	0.4	5.8	4.0	NE	41	08:39	17.9	74	7	NNE	26	1013.9	22.2	59		NE	17	1012.5
21	Mo	14.6	30.7	0	2.0	8.7	ENE	30	02:56	18.3	80	6	ENE	20	1013.8	29.9	26		SW	7	1010.1
22	Tu	15.8	31.9	0	8.0	11.4	SW	44	15:56	23.1	66	3	NNW	28	1010.9	28.7	34		SW	28	1007.9
23	We	11.1	30.9	1.0	8.4	10.7	ESE	43	16:28	20.9	66	1	NNE	7	1013.0	29.1	18		WSW	19	1010.6
24	Th	13.1	29.8	0	8.0	9.0	ENE	37	08:43	19.3	71	0	ENE	17	1014.9	29.0	27		ENE	15	1012.6
25	Fr	14.9	31.9	0	8.0	12.5	ENE	31	20:13	20.4	69	1	NNE	19	1011.6	28.7	31		SSW	11	1008.8
26	Sa	18.0	31.4	0	7.2	8.2	SSE	46	18:41	22.8	68	2	NNE	17	1011.0	28.8	37		SW	15	1007.6
27	Su	15.5	26.1		4.8	6.0	NE	41	00:00	16.4	99	7		Calm	1007.9	24.2	58		ENE	13	1006.1
28	Mo	16.0	19.8		5.4	4.7	ESE	43	22:00	17.8	99	8	ENE	20	1006.7	19.6	86		E	19	1005.4
29	Tu	15.1	26.3	1.6	2.4	2.6	SW	39	11:48	16.6	99	7	SSW	20	1003.0	25.8	50		W	11	1004.5
30	We	9.2	27.4	0	6.0	12.0	NNW	28	14:05	18.1	51	0	NE	9	1012.4	26.0	27		NNE	11	1011.4
31	Th	12.9	30.4	0	5.6	13.3	NW	43	14:42	19.4	84	0	N	13	1012.3	28.3	28		NW	22	1008.7
Statistics for January 2013																					
Mean		14.2	30.5		8.5	10.5				20.9	60	2		20	1011.4	28.5	31			18	1009.4
Lowest		8.1	19.8		2.0	2.6				15.0	27	0		Calm	998.8	19.6	12		SW	7	999.8
Highest		21.1	38.1	1.6	15.2	13.9	NNW	72		29.4	99	8	NNW	46	1020.7	35.6	86		NNW	44	1017.2
Total				4.8	264.0	325.4															

Temperature, humidity, wind, pressure and rainfall observations are from Orange Airport AWS {station 063303}. Cloud, evaporation and sunshine observations are from Orange Agricultural Institute {station 063254}

IDCJDW2105.201301 Prepared at 16:01 UTC on 16 Mar 2013

Orange, New South Wales
February 2013 Daily Weather Observations

Most observations from Orange Airport, but some from Orange Agricultural Institute.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Fr	13.3	25.1	0	10.4	10.6	WNW	69	11:02	21.1	71	4	N	30	1004.6	22.4	51		SW	17	1001.9
2	Sa	9.7	16.8		10.0	9.3	S	41	01:46	9.9	96	7	SE	22	1007.5	16.0	63		SSE	24	1008.4
3	Su	6.8	22.2		3.6	6.5	S	39	15:11	12.7	66	0	SE	22	1013.2	20.0	44		SE	24	1012.2
4	Mo	8.6	24.1		5.0	12.8	E	33	18:07	15.8	78	0	E	17	1019.0	23.1	41		SE	7	1018.0
5	Tu	9.9	24.4	1.0	7.4	12.6	SE	30	15:10	15.6	71	1	ENE	17	1022.0	22.7	48		ENE	17	1019.0
6	We	10.8	26.4	0	5.0	11.7	S	30	14:46	15.6	76	0	ENE	15	1019.0	25.1	31		WSW	9	1015.5
7	Th	11.6	28.6	0	5.0	11.4	S	26	15:54	18.2	75	0	NE	11	1016.6	27.2	35		NNW	4	1014.5
8	Fr	13.6	30.3	0	7.2	12.8	NNW	35	07:59	21.5	43	0	NNW	26	1017.4	29.3	33		S	7	1016.5
9	Sa	15.5	30.9	0	8.0	12.6	SW	39	18:54	22.5	54	4	NNW	17	1017.0	29.3	31			Calm	1014.6
10	Su	13.2	29.7		7.8	10.8	N	43	15:46	21.3	57	6	NNW	13	1015.4	27.6	32		NW	13	1013.7
11	Mo	13.2	25.0		5.6	11.0	E	43	19:31	16.9	85	1	NE	15	1015.6	23.7	66		ESE	22	1014.4
12	Tu	11.9	25.4	5.2	6.0	12.0	E	41	17:54	16.9	84	1	ENE	17	1017.4	24.4	46		ESE	20	1016.2
13	We	9.8	22.5	0	6.0	12.2	ENE	37	08:13	14.6	88	5	ENE	22	1020.3	21.8	48		ENE	17	1018.5
14	Th	10.3	23.6	0	5.8	12.0	NE	30	08:47	14.6	76	0	ENE	20	1019.4	22.8	40		ENE	7	1017.3
15	Fr	9.0	24.1	0	6.0	11.5	E	43	17:24	15.8	79	4	E	19	1018.8	23.6	45		E	13	1016.9
16	Sa	9.7	24.2	0	6.2	11.8	ESE	35	18:18	15.4	78	1	ENE	15	1019.5	22.8	38		ESE	15	1017.5
17	Su	12.2	23.3	0	6.0	12.4	E	33	21:31	15.5	83	2	NE	19	1019.3	22.6	41		ESE	13	1017.3
18	Mo	9.1	23.6	0	6.0	12.2	E	35	18:24	14.7	82	1	ENE	26	1016.9	20.9	46		ENE	13	1014.1
19	Tu	8.8	26.8	0	6.0	11.8	SSW	28	15:55	16.9	85	0	N	9	1014.5	24.3	33		SSE	17	1012.2
20	We	12.1	26.0	0	5.8	11.7	E	43	11:08	19.1	72	0	E	19	1014.9	24.6	45		ESE	24	1014.5
21	Th	13.5	24.4	0	6.0	11.9	ESE	50	12:05	17.2	86	7	E	26	1016.3	23.7	44		E	30	1015.3
22	Fr	13.2	23.6	0	8.0	10.5	ESE	69	11:34	16.9	69	3	ESE	39	1015.5	22.0	54		ESE	39	1014.5
23	Sa	14.0	22.1	0.2	7.2	0.0	ESE	59	12:58	16.3	82	8	ESE	35	1011.6	21.5	69		ESE	35	1008.5
24	Su	16.3	21.4	0.8	5.0	1.8	E	48	23:03	17.2	100	8	NNE	24	1009.7	18.8	100		N	20	1010.5
25	Mo	14.9	27.1	0.2	1.6	1.6	NNW	28	09:02	19.9	88	3	NNW	15	1016.5	25.4	55		SSW	9	1014.7
26	Tu	17.7	24.2	0	4.0	6.5	NE	43	18:24	20.2	91	7	ENE	17	1016.6	22.1	74		ESE	4	1014.5
27	We	16.9	22.8	0.2	5.0	1.0	NNW	31	11:03	18.2	100	8	NNE	9	1014.6	22.0	77		N	17	1011.7
28	Th	17.2	18.6	0	1.4	1.9	NNW	46	10:02	18.3	93	8	NNW	26	1008.5	17.9	100		N	19	1006.7
Statistics for February 2013																					
Mean		12.2	24.5		6.0	9.5				17.1	78	3		20	1015.6	23.1	51			16	1013.9
Lowest		6.8	16.8		1.4	0.0				9.9	43	0	#	9	1004.6	16.0	31			Calm	1001.9
Highest		17.7	30.9	5.2	10.4	12.8	#	69		22.5	100	8	ESE	39	1022.0	29.3	100		ESE	39	1019.0
Total				7.6	167.0	264.9															

Temperature, humidity, wind, pressure and rainfall observations are from Orange Airport AWS {station 063303}. Cloud, evaporation and sunshine observations are from Orange Agricultural Institute {station 063254}

Orange, New South Wales
March 2013 Daily Weather Observations

Most observations from Orange Airport, but some from Orange Agricultural Institute.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Fr	11.4	16.1	109.6	6.0	1.5	SE	54	16:49	13.4	100	8	ESE	26	1010.7	15.2	90		ESE	37	1012.6
2	Sa	9.3	17.2	1.6	3.0	5.2	ESE	61	10:57	12.4	79	4	ESE	33	1017.5	16.1	68		ESE	35	1017.5
3	Su	12.1	19.2	0.2	6.6	7.8	E	61	09:43	13.6	93	8	E	31	1018.7	18.0	71		E	33	1018.2
4	Mo	11.3	21.6	0	1.8	8.5	ENE	43	08:25	15.3	81	2	ENE	26	1019.7	20.9	53		ENE	24	1018.1
5	Tu	9.7	21.7	0	5.2	11.2	ENE	56	08:27	15.0	76	2	ENE	30	1019.7	21.1	55		NE	26	1017.8
6	We	9.7	23.8	0	5.0	11.6	ENE	31	00:03	15.3	84	1	NE	15	1020.0	22.2	49		ESE	7	1017.5
7	Th	8.0	25.8	0	4.8	11.7	SSE	20	13:47	15.7	92	0		Calm	1019.8	23.9	42		SSW	9	1017.1
8	Fr	10.4	23.6	0	5.6	11.4	NE	28	09:31	15.3	95	1	NE	9	1021.0	22.8	48		E	7	1018.7
9	Sa	10.5	24.3	0	4.8		N	22	10:49	16.0	84	2	NE	11	1020.8	23.1	53		WSW	6	1018.6
10	Su	11.8	24.9	0			SW	24	12:23	16.2	89			Calm	1020.0	24.3	53		S	7	1017.8
11	Mo	11.3	23.4	0	7.0	11.4	NE	26	10:02	16.5	88	0	ENE	15	1020.0	22.7	49		E	9	1018.4
12	Tu	11.2	23.2	0	5.8	11.0	NE	30	11:06	16.2	88	0	ENE	11	1020.4	22.1	47		NE	11	1017.0
13	We	10.1	24.5	0	3.2	10.2	NNW	28	11:34	15.6	95	3	N	13	1014.8	21.6	55		ESE	4	1011.8
14	Th	13.1	24.6	2.2	5.0	10.2	E	22	20:34	17.1	96	7		Calm	1011.8	23.9	62		ENE	9	1011.0
15	Fr	12.8	25.2	0	3.6	6.3	NE	20	08:42	17.9	95	1	ENE	9	1015.9	23.7	52		W	9	1014.5
16	Sa	12.0	24.7	0	3.4	10.0	WSW	41	13:38	16.4	100	2	N	15	1014.0	23.4	44		WNW	24	1010.9
17	Su	8.8	17.2	0	5.6	11.1	SW	41	02:11	9.6	95	6	S	19	1013.0	17.1	42		S	19	1014.2
18	Mo	3.1	19.4	0	4.0	11.2	SE	22	20:24	9.2	91	7	ENE	7	1018.8	17.2	40		WSW	9	1017.8
19	Tu	5.3	19.7	0	4.0	9.0	NW	35	14:19	12.0	88	1	ENE	20	1021.6	17.9	53		NNE	11	1019.8
20	We	9.2	19.4	0	4.0	8.5	NNE	28	08:10	13.3	82	7	NNE	13	1023.6	18.7	57		N	19	1020.7
21	Th	9.7	22.1	0	3.2	5.5	N	56	12:42	15.0	86	3	N	26	1018.0	19.7	53		N	37	1013.3
22	Fr	14.8	23.6	0.8	3.0	5.0	NNW	54	12:46	17.0	99	8	NNW	28	1016.0	22.0	76		NW	39	1014.0
23	Sa	14.4	21.6	9.4	2.0	3.0	NW	41	09:45	17.5	94	7	NW	22	1017.6	20.0	77		WSW	19	1015.6
24	Su	8.0	24.1	0.6	2.8	6.6	WNW	43	12:00	16.7	100	2	NNW	9	1017.2	22.5	54		W	20	1014.2
25	Mo	6.2	25.6	0	6.0	10.8	WNW	20	11:50	17.3	59	0		Calm	1018.7	24.4	31		ENE	6	1017.4
26	Tu	8.7	23.6	0	4.0	9.5	NW	30	12:06	16.6	75	4		Calm	1019.8	22.6	57		NNW	19	1017.2
27	We	10.2	25.0	0	3.2	5.6				18.2	85	4	N	15	1019.7	24.6	55		NNW	22	1017.4
28	Th	12.8	21.2		4.0	10.7	NW	50	11:28	18.9	76	6	NNW	26	1018.6	20.8	71		NW	24	1015.6
29	Fr	7.3	17.6	4.2	3.0	1.5	SW	39	00:48	9.2	80	1	S	15	1016.8	17.2	48		S	2	1015.1
30	Sa	3.9	20.6	0	3.4	9.2	NW	24	14:54	10.0	100	0	NE	9	1015.9	19.4	54		NNW	9	1011.9
31	Su	9.7	16.6	0.2	3.0	9.3	SSW	39	10:52	10.4	85	8	SW	13	1013.0	15.2	65		SW	20	1012.0
Statistics for March 2013																					
Mean		9.9	22.0		4.2	8.4				14.8	88	3		15	1017.8	20.8	55			17	1015.9
Lowest		3.1	16.1		1.8	1.5				9.2	59	0		Calm	1010.7	15.2	31		S	2	1010.9
Highest		14.8	25.8	109.6	7.0	11.7	#	61		18.9	100	8	ESE	33	1023.6	24.6	90		NW	39	1020.7
Total				128.8	126.0	244.5															

Temperature, humidity, wind, pressure and rainfall observations are from Orange Airport AWS {station 063303}. Cloud, evaporation and sunshine observations are from Orange Agricultural Institute {station 063254}

IDCJDW2105.201303 Prepared at 16:01 UTC on 2 May 2013

11 Trial design

This was a tissue residue study with seventy-two (72) treated cattle and two (2) untreated control cattle in store condition. This allowed for the two untreated animals to be sampled and for 12 sampling times with 6 animals each time for all remaining animals that were treated at the same concentration. The trial design, site selection and animal identification was as described in SOP AH001 and in this report.

Due to wet conditions as explained in amendment 3 cattle were weighed on day -3 rather than the originally proposed day -7. On day -3 the cattle were weighed and ranked by live mass. Individual animals were identified with two unique coloured and numbered ear tags, one tag in each ear. All cattle had a white ear tag numbered 1 to 74 in the left (near) side ear, and following allocation a differently coloured ear tag was placed into the right ear for each tissue sampling group. The group pear tags were as follows:

Sampling Treatment Group	Right Ear tag Colour	Right Ear tag Numbers
2.1	Red	2-1 to 2-6
2.2	Orange	3-1 to 3-6
2.3	Yellow	4-1 to 4-6
2.4	Green	5-1 to 5-6
2.5	Blue	6-1 to 6-6
2.6	Pink	7-1 to 7-6
2.7	Purple	8-1 to 8-6
2.8	Red/ Yellow	9-1 to 9-6
2.9	Yellow/ Red	10-1 to 10-6
2.10	Green/ Pink	11-1 to 11-6
2.11	Blue/ Green	12-1 to 12-6
2.12	Pink/ Blue	13-1 to 13-6

All of the animals within each gender were weighed and ranked from highest to lowest weight. The animal ranked 37 was allocated as the remaining untreated animal as per amendments 1 and 2.

The remaining animals in each gender group were blocked into 6 blocks of 12 animals from highest to lowest weight and one animal from within each block was randomly allocated using a random number generator to the 12 tissue sampling groups to be treated with the Test Item. This gave 12 groups of cattle with a similar mean bodyweight. Sampling times were randomly allocated to each group.

All animals in Group 2 were treated with the Test Item on Day -2 and Day 0, 14 and 16 August 2012 respectively. The remaining untreated animal was kept in isolation from Day -3, 13 August 2012.

Untreated samples were collected on Day -80, 28 May 2012 (refer to amendment 1) and Day 6, 22 August 2012.

On Days 7 (23 August 2012), 14 (30 August 2012), 28 (13 September 2012), 42 (27 September 2012), 56 (11 October 2012), 70 (25 October 2012), 84 (8 November 2012), 98 (22 November 2012), 119 (13 December 2012), 147 (10 January 2013), 175 (7 February 2013) and 203 (7 March 2013) post-treatment samples from Group 2 were collected.

12 Treatment details

All animals were weighed on Day -3 (13 August 2012), and the untreated control animal still remaining was maintained separately following allocation on this day.

There were two applications each of BUTALEX Injection (50 mg/mL buparvaquone) applied via intramuscular injection at 5 mL per 100kg bodyweight , to the neck on Day -2 (14 August 2012) and Day 0 (16 August 2012).

The treatment groups are as follows:

Treatment Group	Concentration	Dose Volume (mL/100 kg Body Weight)	Number of Cattle
1. Untreated Control	Nil	Nil	2
2. BUTALEX	50 mg/mL buparvaquone	5.0	72

13 Application methods and details

Calibration of applicators and scales, and weighing of animals was done according to SOPs EQ006 and EQ005.

The untreated control animal was moved to its holding yard prior to treatment of any other animals and remained physically separated from the treated cattle for the duration of the study.

Each of the animals in Treatment Group 2 was restrained in a head crush and with a metal ring and rope halter. The Test Item was then administered intramuscularly into the upper neck muscle approximately 20 cm down the spine from the atlas and axis joint at the request of the Study Sponsor. Injection sites were shaved and then swabbed with methylated spirits immediately prior to treatment to remove any dirt or faecal material from the proposed injection site. The shaving process whilst the animal was restrained can be seen in the following picture.

The Test Item was administered at a dose rate of 5 mL/100 kg bodyweight on Day -2 and Day 0. Prior to administration the test item was inverted 10 times to ensure that adequate mixing of the product occurred prior to treatment. Individual animals were weighed and dosed to their individual body weight. The volume (mL) administered was equal to the individual animals bodyweight (kg) divided by 100 and multiplied by 5. Doses were rounded up to the next 0.2 mL increment when rounding was required but did not exceed 10 mL per injection. As in all cases the dose required was greater than 10 mL. (animals greater than 200 kg) the dose for each treatment day was split in half and two injections were placed in the same side of the neck approximately 25 mm apart on both Day -2 and Day 0. Administration of the product was via calibrated (SOP EQ008) 10 mL syringes graduated in 0.2 mL increments (Batch no. U07S) and fitted with sterilised 1.5 inch 18 gauge needles. New needles were used for each injection and were inserted approximately 15mm into the neck muscle for all injections. The injection of the product into the neck muscle whilst the animal was restrained can be seen in the following picture.

Individual animal weights, calculated and administered doses and the time of treatment were all recorded for each animal.

To minimise exposure to the active constituents during application, safety precautions were taken. Long sleeved shirts and chemical resistant gloves should were worn by all involved Study Personnel. The Principal Investigator was responsible for the health and welfare of the personnel involved in the study.

13.1 Adverse Events

The treated animals were inspected at 1 and 2 hours post-treatment both on Day -2 (14 August 2012) and Day 0 (16 August 2012) and at regular intervals thereafter for any adverse events.

No adverse events occurred as a result of treatment with the Test Item.

Prior to treatment on Day -80 (28 May 2012) animal White 1 fell over whilst in the yards and was trampled by other cattle which caused a back injury so that the animal was unable to walk. After being attended by a veterinarian and cared for over 6 days the decision was made that as there had been no improvement the animal should be humanely euthanased and sampled from as one of the untreated control animals. This is detailed in amendment 1.

On the 12 September 2012 animal Green 11-3 was observed to be suffering from weight loss and general ill-thrift and uncharacteristic behaviour. This animal was kept under close observation and was tested for pestivirus via a blood test on the 18 September 2012. After the test returned a negative result it was decided after consultation with the Study Sponsor that this animal should be swapped with an animal from the next sampling Group due to no improvement in the animal's condition. No cause of the illness was discovered and the animal was sampled from at the 42 DAT sampling as outlined in deviation 2. Upon euthanasia and sampling it was noticed by Agrisearch research staff that the animal's lymph nodes were enlarged. It is unknown whether this was a result of the chemical or from outside factors.

14 Sampling methods and details

Residue sampling was undertaken according to the Study Plan and Agrisearch Services Pty Ltd Standard Operating Procedure AH005 and EMEA CVMP Guideline on Injection Site Residues 13 April 2005.

Tissue sampling was conducted according to the schedule presented below:

Sampling Treatment Group	Number of Animals	Interval Between Treatment of Group 2 and Sampling (Days)
1. Untreated	2	6*
2.1 BUTALEX	6	7
2.2 BUTALEX	6	14
2.3 BUTALEX	6	28
2.4 BUTALEX	6	42
2.5 BUTALEX	6	56
2.6 BUTALEX	6	70
2.7 BUTALEX	6	84
2.8 BUTALEX	6	98
2.9 BUTALEX	6	119
2.10 BUTALEX	6	147
2.11 BUTALEX	6	175
2.12 BUTALEX	6	203

*Note that the untreated control animal W1-1 was sampled early at 80 days prior to treatment as it was seriously injured. Refer to Amendment 1. The second untreated control animal was sampled at Day 6 post-treatment of Group 2.

To avoid cross contamination between cattle during sampling there were a minimum of four trained personnel involved. There were two distinct groups of personnel; a “dirty” group that slaughtered the animals and handled the outside of each animal and this group took extreme care to avoid contaminating the tissues inside the carcass. Then there was the “clean” group who collected the tissue samples. The “clean group” trained personnel and the designated “clean group” sample processor were the only personnel handling the tissue samples.

Tissues were collected from six sites on every animal: neck muscle, subcutaneous back fat (within 100 mm of the dorsal midline; if there was insufficient fat for sampling on the back, the subcutaneous fat sample was supplemented from the brisket for the reserve sample and this noted in the sample collection records), skeletal muscle (tender loin region), liver, perirenal fat and kidney. Samples were chilled following collection and placed in the Test Facility GLP freezer within 12 hours of collection.

The untreated control animal W1-1 was sampled early at 80 days prior to treatment as it was seriously injured (Refer to Amendment 1). The second untreated control animal was processed first at the initial sampling time of 6 days post-treatment to avoid cross contamination from treated animals.

One animal at a time was sampled (the next animal was slaughtered while the collection was occurring on the previous animal; this took place at a distance that avoided any possibility of splashing contaminated blood or water onto the animal being sampled). The scissors, scalpel and forceps were cleaned in hot water and rinsed in methanol between each tissue type if they were required to be re-used. The tissue sample collector donned new disposable gloves between tissue types. All equipment used was thoroughly cleaned between animals and the “dirty group” cleaned their own knives between animals in a different area to where the sampling instruments were being cleaned.

A primary and a reserve sample (when sufficient sample available) of each tissue type was collected from each animal. A minimum weight of approximately 100 g/sample of each tissue type were removed from each treated animal where possible.

A minimum weight of approximately 200 g/sample of each tissue type were removed from the untreated control animal where possible. Specimens were weighed using a calibrated balance.

The individual tissue samples were placed directly without any other contact into a labelled double plastic bag held open by the sample processor and then weighed. A label was located between the two bags enclosing each tissue sample. The label was in accordance with Agrisearch SOP AD017. The samples were chilled following sampling and transferred to the Test Facility GLP freezer at the completion of the days sampling (Refer to SOP AD018). The tissue samples from the untreated control animal were stored away from the Test Item treated samples.

The reserve set of samples from each animal along with all primary and reserve samples from the final two sampling dates will be stored at the Test Facility GLP freezer and the temperature constantly monitored (Agrisearch SOP AD018) until approval for disposal is given by the Sponsor.

The first shipment of the primary specimens was packed and shipped to the Test Site analytical laboratory in a GLP freezer van as described in Agrisearch SOP AD019 on 14 October 2012. The final shipment was made on 14 January 2013. The shipments contained a Chain of Custody Form and Sample Summary Form identifying all the samples in the shipment. The temperature of the primary samples was monitored during transport to the analytical laboratory by a calibrated TinyTag temperature data logger.

Both the primary and the reserve tissue samples for the untreated control group animal were shipped to the Test Site analytical laboratory in the first shipment.

The carcasses of the slaughtered animals were used for pet food.

15 Sample identification

The labels used to identify the samples were in accordance with Agrisearch SOP AD017.

The following samples were taken from each animal. A fully detailed keylist with sample numbers can be found in the Appendices.

Replicate	Substrate	Sampling Interval	Product	Rate	Breed
Primary	Neck Muscle	6, 7, 14, 28, 42, 56, 70, 84, 98, 119, 147, 175 and 203 DAT	UTC or Buparvaquone	nil, 2.5 mg/kg	Bos Taurus
Primary	Back fat	6, 7, 14, 28, 42, 56, 70, 84, 98, 119, 147, 175 and 203 DAT	UTC or Buparvaquone	nil, 2.5 mg/kg	Bos Taurus
Primary	Muscle	6, 7, 14, 28, 42, 56, 70, 84, 98, 119, 147, 175 and 203 DAT	UTC or Buparvaquone	nil, 2.5 mg/kg	Bos Taurus
Primary	Liver	6, 7, 14, 28, 42, 56, 70, 84, 98, 119, 147, 175 and 203 DAT	UTC or Buparvaquone	nil, 2.5 mg/kg	Bos Taurus
Primary	Perirenal fat	6, 7, 14, 28, 42, 56, 70, 84, 98, 119, 147, 175 and 203 DAT	UTC or Buparvaquone	nil, 2.5 mg/kg	Bos Taurus
Primary	Kidney	6, 7, 14, 28, 42, 56, 70, 84, 98, 119, 147, 175 and 203 DAT	UTC or Buparvaquone	nil, 2.5 mg/kg	Bos Taurus
Reserve	Neck Muscle	6, 7, 14, 28, 42, 56, 70, 84, 98, 119, 147, 175 and 203 DAT	UTC or Buparvaquone	nil, 2.5 mg/kg	Bos Taurus
Reserve	Back fat	6, 7, 14, 28, 42, 56, 70, 84, 98, 119, 147, 175 and 203 DAT	UTC or Buparvaquone	nil, 2.5 mg/kg	Bos Taurus
Reserve	Muscle	6, 7, 14, 28, 42, 56, 70, 84, 98, 119, 147, 175 and 203 DAT	UTC or Buparvaquone	nil, 2.5 mg/kg	Bos Taurus
Reserve	Liver	6, 7, 14, 28, 42, 56, 70, 84, 98, 119, 147, 175 and 203 DAT	UTC or Buparvaquone	nil, 2.5 mg/kg	Bos Taurus
Reserve	Perirenal fat	6, 7, 14, 28, 42, 56, 70, 84, 98, 119, 147, 175 and 203 DAT	UTC or Buparvaquone	nil, 2.5 mg/kg	Bos Taurus
Reserve	Kidney	6, 7, 14, 28, 42, 56, 70, 84, 98, 119, 147, 175 and 203 DAT	UTC or Buparvaquone	nil, 2.5 mg/kg	Bos Taurus

DAT = Days after application of treatments

16 Sample handling

Samples were handled and stored according to Agrisearch Services SOP AD018.

Samples were packed into double heavy polythene bags and individually labelled. Untreated and treated samples were placed in separate containers in the vehicle and transported to, and placed in, the sample storage rooms, immediately upon return from the field. The untreated and treated samples were physically separate in the same storage room. The temperature of the sample storage room was monitored regularly to ensure the samples were maintained below the desired temperature and to ensure the sample storage room was functioning normally.

Samples remained in freezer storage prior to dispatching to Agrisearch Analytical Pty Ltd, Level 1, 48 Victoria Road, Rozelle, New South Wales, 2039 for the residue analysis component of the study. Samples were packaged and shipped as outlined in the Agrisearch Services Pty Ltd Standard Operating Procedure AD019.

Sample dispatch details are listed in the following table.

Samples	Storage Location	Destination	Dispatched	Received
Primary and Reserve UTC and Primary Treated	Orange	Rozelle	14 October 2012	15 October 2012
Primary - missing kidney sample	Orange	Rozelle	24 October 2012	25 October 2012
Primary	Orange	Rozelle	26 November 2012	26 November 2012
Primary	Orange	Rozelle	27 November 2012	27 November 2012
Primary	Orange	Rozelle	17 December 2012	17 December 2012
Primary	Orange	Rozelle	14 January 2013	14 January 2013

A Sample Shipping Chain of Custody accompanied the samples. A temperature data logger was placed with the samples in transit to monitor the temperature. Logger temperatures recorded during the transit of samples to the analytical laboratory are presented in the following table.

Journey	Date	Temperature Range °C
Orange to Rozelle	15 Oct 2012	-15.9 to -7.3
Orange to Rozelle	26 Nov 12	-17.3 to -7.8
Orange to Rozelle	27 Nov 12	-17.3 to -5.5
Orange to Rozelle	17 Dec 12	-16.2 to -7.0
Orange to Rozelle	14 Jan 13	-16.2 to -10.4

All samples arrived at the Agrisearch Analytical Pty Ltd laboratory in a frozen state and in excellent condition as documented on the Sample Shipping Chain of Custody.

17 Analytical procedures

17.1 Reference standards

The following analytical grade standards used in this study were supplied by MSD Animal Health:

- Buparvaquone (Purity: 99.68%, Batch: N/A, Expiry: N/A).
- Buparvaquone (Purity: 100.17%, Batch: S789, Expiry: 31 October 2015).

At the commencement of the study, the only analytical standard of buparvaquone available to the test site was the one listed above with a purity of 99.68%. This standard was provided by MSD Animal Health for the initial method development and validation of the buparvaquone method. This analytical standard did not have a certificate of analysis. This analytical standard was used for the analysis of buparvaquone residues in all samples.

The analytical standard of buparvaquone (Batch: S789) was received on 19 February 2013 after all samples (up to and including DAT 147) had been analysed. A standard comparison was performed between the stock standard solutions of both analytical standards and it was found that there was no significant deviation between the two standards.

A Certificate of Analysis of the reference standard (Batch: S789) is shown in Appendix 1 of the Analytical Report.

17.2 Bovine residues

Buparvaquone residues were determined according to:

> *"Determination of Buparvaquone Residues in Bovine Tissues and Milk by HPLC/MS/MS", AATM-R-170, Revision 1, Agrisearch Analytical Pty Ltd, October 2011.*

A summary of the method is presented below:

> *Buparvaquone residues are extracted from bovine tissues with acetonitrile:acetone (8:2). An aliquot of the extract is taken and cleaned up by solid phase extraction (SPE). The sample is eluted in 2% acetic acid in acetonitrile, filtered and analysed for buparvaquone using ultra performance liquid chromatography (UPLC) with negative-ion electrospray ionization (ESI) tandem mass spectrometry (MS/MS).*

The above analytical method was validated by fortifying sub-samples of untreated control bovine tissues with known amounts of the test substance buparvaquone. The fortified samples were then analysed using the defined method and the recovery of the test compound was determined.

17.3 Long term freezer stability of buparvaquone in test samples

The elapsed time between first sample collection and final analysis of the treated samples stored in a freezer at -20°C never exceeded 82 days.

Sample Collection Day	Sample Collection Date	Date Analysis Completed	Storage Period (days)
DAT 7	23 August 2012	13 November 2012	82
DAT 14	30 August 2012	13 November 2012	75
DAT 28	13 September 2012	13 November 2012	61
DAT 42	27 September 2012	13 November 2012	47
DAT 56	11 October 2012	13 November 2012	33
DAT 70	25 October 2012	10 December 2012	46
DAT 84	8 November 2012	10 December 2012	32
DAT 98	22 November 2012	10 December 2012	18
DAT 119	13 December 2012	15 January 2013	33
DAT 147	10 January 2013	4 February 2013	25

Triplicate samples of each tissue substrate were fortified with buparvaquone at the LOQ (0.01 mg/kg) and 10 x LOQ (0.1 mg/kg) on 30 October 2012 by Agrisearch Analytical Pty Ltd and were stored at approximately -20°C for 84-87 days. These long term freezer storage stability samples were assayed for buparvaquone content on 22 January 2013, 24 January 2013 and 25 January 2013 (fat, kidney/muscle and liver, respectively). The long term freezer storage stability samples were analysed along with freshly prepared QC recoveries spiked with buparvaquone at 0.01 mg/kg.

The results of the long term freezer stability of buparvaquone in tissue samples that were stored for 84-87 days are presented in the table below:

Matrix	Fortification Level (mg/kg)	Mean Recovery of Freezer Storage Samples* (%)	Recovery of Freshly Prepared QC Samples (%)
Liver	0.01001	89	101
Liver	0.1001	81	
Kidney	0.01001	104	91
Kidney	0.1001	101	
Muscle	0.01001	95	107
Muscle	0.1001	96	
Fat	0.01001	78	83
Fat	0.1001	96	

***Note**: Mean of 3 replicate samples spiked at two fortification levels and stored for 84 days for fat, 86 days for muscle and kidney and 87 days for liver stored at approximately -20ºC.

The buparvaquone content of liver, kidney, muscle and fat samples shows no significant degradation after 84-87 days freezer storage (at approximately -20°C).

The detailed results of long term freezer stability of buparvaquone in test samples and concurrent analysed freshly prepared QC recoveries are presented in Table 11.

18 Results

Results are summarised in Tables 1-7. Full analytical results are presented in the Agrisearch Analytical report 12-0780 presented in the Appendices.

18.1 Recovery data

Repeatability of the method, expressed as the relative standard deviation (RSD) of the recovery measurements at each fortification level is shown in the table below:

Table 1 Recovery data for buparvaquone

Substrate	Fortification Level (mg/kg)	Number of replicates	Mean Recovery ± RSD (%)
Liver	0.01	8	103 ± 6.3
Liver	0.1	6	93 ± 6.8
Liver	2	1	107
Kidney	0.01	8	102 ± 10
Kidney	0.1	6	99 ± 6.2
Muscle	0.01	10	92 ± 11
Muscle	0.1	6	90 ± 5.9
Muscle	10	5	72 ± 4.6
Muscle	20	2	72
Muscle	30	2	74
Fat	0.01	7	95 ± 14
Fat	0.1	6	104 ± 6.2

RSD = Relative standard deviation (minimum five replicates)

The RSD was ≤20% for buparvaquone at each validation level. Therefore the precision of the method meets the acceptance criteria.

The recovery data for this study meets the criteria for acceptability at the test site (SOP-08) and with APVMA guidelines for acceptable recoveries (accuracy of 70-110%). Detailed results of recovery assays are shown in Table 1.

18.2 Tables of Residue Data

Table 2 Residues of buparvaquone in bovine liver following treatment with BUTALEX

Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
12-0419-04	UTC	-80 DAT	28-May-12	13-Nov-12	<LOD
12-0419-16	UTC	6 DAT	22-Aug-12	13-Nov-12	<LOD
12-0419-28	2.5	7 DAT	23-Aug-12	13-Nov-12	1.25
12-0419-40	2.5	7 DAT	23-Aug-12	13-Nov-12	1.49
12-0419-52	2.5	7 DAT	23-Aug-12	13-Nov-12	1.41
12-0419-64	2.5	7 DAT	23-Aug-12	13-Nov-12	1.42
12-0419-76	2.5	7 DAT	23-Aug-12	13-Nov-12	1.37
12-0419-88	2.5	7 DAT	23-Aug-12	13-Nov-12	1.32
12-0419-100	2.5	14 DAT	30-Aug-12	13-Nov-12	1.40
12-0419-112	2.5	14 DAT	30-Aug-12	13-Nov-12	1.41
12-0419-124	2.5	14 DAT	30-Aug-12	13-Nov-12	1.55
12-0419-136	2.5	14 DAT	30-Aug-12	13-Nov-12	1.43
12-0419-148	2.5	14 DAT	30-Aug-12	13-Nov-12	1.31
12-0419-160	2.5	14 DAT	30-Aug-12	13-Nov-12	1.60
12-0419-172	2.5	28 DAT	13-Sep-12	13-Nov-12	1.44
12-0419-184	2.5	28 DAT	13-Sep-12	13-Nov-12	1.51
12-0419-196	2.5	28 DAT	13-Sep-12	13-Nov-12	0.40
12-0419-208	2.5	28 DAT	13-Sep-12	13-Nov-12	1.30
12-0419-220	2.5	28 DAT	13-Sep-12	13-Nov-12	1.27
12-0419-232	2.5	28 DAT	13-Sep-12	13-Nov-12	1.12
12-0419-244	2.5	42 DAT	27-Sep-12	13-Nov-12	1.40
12-0419-256	2.5	42 DAT	27-Sep-12	13-Nov-12	0.80
12-0419-268	2.5	42 DAT	27-Sep-12	13-Nov-12	0.91
12-0419-280	2.5	42 DAT	27-Sep-12	13-Nov-12	1.17
12-0419-292	2.5	42 DAT	27-Sep-12	13-Nov-12	1.14
12-0419-304	2.5	42 DAT	27-Sep-12	13-Nov-12	1.19
12-0419-316	2.5	56 DAT	11-Oct-12	13-Nov-12	0.15
12-0419-328	2.5	56 DAT	11-Oct-12	13-Nov-12	0.51
12-0419-340	2.5	56 DAT	11-Oct-12	13-Nov-12	0.88
12-0419-352	2.5	56 DAT	11-Oct-12	13-Nov-12	0.59
12-0419-364	2.5	56 DAT	11-Oct-12	13-Nov-12	0.61
12-0419-376	2.5	56 DAT	11-Oct-12	13-Nov-12	0.089

Cont...

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Table 2 (Continued) Residues of buparvaquone in bovine liver following treatment with BUTALEX

Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
120419-388	2.5	70 DAT	25-Oct-12	06-Dec-12	0.28
120419-400	2.5	70 DAT	25-Oct-12	06-Dec-12	0.18
120419-412	2.5	70 DAT	25-Oct-12	06-Dec-12	0.31
120419-424	2.5	70 DAT	25-Oct-12	06-Dec-12	0.17
120419-436	2.5	70 DAT	25-Oct-12	06-Dec-12	0.35
120419-448	2.5	70 DAT	25-Oct-12	06-Dec-12	0.33
120419-460	2.5	84 DAT	08-Nov-12	06-Dec-12	0.14
120419-472	2.5	84 DAT	08-Nov-12	06-Dec-12	0.25
120419-484	2.5	84 DAT	08-Nov-12	06-Dec-12	0.16
120419-496	2.5	84 DAT	08-Nov-12	06-Dec-12	0.28
120419-508	2.5	84 DAT	08-Nov-12	06-Dec-12	0.29
120419-520	2.5	84 DAT	08-Nov-12	06-Dec-12	0.29
120419-532	2.5	98 DAT	22-Nov-12	06-Dec-12	0.25
120419-544	2.5	98 DAT	22-Nov-12	06-Dec-12	0.19
120419-556	2.5	98 DAT	22-Nov-12	06-Dec-12	0.061
120419-568	2.5	98 DAT	22-Nov-12	06-Dec-12	0.091
120419-580	2.5	98 DAT	22-Nov-12	06-Dec-12	0.066
120419-592	2.5	98 DAT	22-Nov-12	06-Dec-12	0.25
12-0419-604	2.5	119 DAT	13-Dec-12	11-Jan-13	0.083
12-0419-616	2.5	119 DAT	13-Dec-12	11-Jan-13	0.073
12-0419-628	2.5	119 DAT	13-Dec-12	11-Jan-13	0.075
12-0419-640	2.5	119 DAT	13-Dec-12	11-Jan-13	0.097
12-0419-652	2.5	119 DAT	13-Dec-12	11-Jan-13	0.17
12-0419-664	2.5	119 DAT	13-Dec-12	11-Jan-13	0.085
12-0419-676	2.5	147 DAT	10-Jan-13	25-Jan-13	0.050
12-0419-688	2.5	147 DAT	10-Jan-13	25-Jan-13	0.17
12-0419-700	2.5	147 DAT	10-Jan-13	25-Jan-13	0.095
12-0419-712	2.5	147 DAT	10-Jan-13	25-Jan-13	0.20
12-0419-724	2.5	147 DAT	10-Jan-13	25-Jan-13	0.040
12-0419-736	2.5	147 DAT	10-Jan-13	25-Jan-13	0.17

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Table 3 Residues of buparvaquone in bovine kidney following treatment with BUTALEX

Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
12-0419-06	UTC	-80 DAT	28-May-12	05-Nov-12	<LOD
12-0419-18	UTC	6 DAT	22-Aug-12	05-Nov-12	<LOD
12-0419-30	2.5	7 DAT	23-Aug-12	05-Nov-12	0.29
12-0419-42	2.5	7 DAT	23-Aug-12	05-Nov-12	0.29
12-0419-54	2.5	7 DAT	23-Aug-12	05-Nov-12	0.34
12-0419-66	2.5	7 DAT	23-Aug-12	05-Nov-12	0.30
12-0419-78	2.5	7 DAT	23-Aug-12	05-Nov-12	0.33
12-0419-90	2.5	7 DAT	23-Aug-12	05-Nov-12	0.31
12-0419-102	2.5	14 DAT	30-Aug-12	05-Nov-12	0.28
12-0419-114	2.5	14 DAT	30-Aug-12	05-Nov-12	0.26
12-0419-126	2.5	14 DAT	30-Aug-12	05-Nov-12	0.30
12-0419-138	2.5	14 DAT	30-Aug-12	05-Nov-12	0.30
12-0419-150	2.5	14 DAT	30-Aug-12	05-Nov-12	0.31
12-0419-162	2.5	14 DAT	30-Aug-12	05-Nov-12	0.27
12-0419-174	2.5	28 DAT	13-Sep-12	05-Nov-12	0.24
12-0419-186	2.5	28 DAT	13-Sep-12	05-Nov-12	0.24
12-0419-198	2.5	28 DAT	13-Sep-12	05-Nov-12	0.073
12-0419-210	2.5	28 DAT	13-Sep-12	05-Nov-12	0.21
12-0419-222	2.5	28 DAT	13-Sep-12	05-Nov-12	0.24
12-0419-234	2.5	28 DAT	13-Sep-12	05-Nov-12	0.20
12-0419-246	2.5	42 DAT	27-Sep-12	05-Nov-12	0.25
12-0419-258	2.5	42 DAT	27-Sep-12	05-Nov-12	0.12
12-0419-270	2.5	42 DAT	27-Sep-12	05-Nov-12	0.20
12-0419-282	2.5	42 DAT	27-Sep-12	05-Nov-12	0.22
12-0419-294	2.5	42 DAT	27-Sep-12	05-Nov-12	0.19
12-0419-306	2.5	42 DAT	27-Sep-12	05-Nov-12	0.21
12-0419-318	2.5	56 DAT	11-Oct-12	05-Nov-12	0.056
12-0419-330	2.5	56 DAT	11-Oct-12	05-Nov-12	0.10
12-0419-342	2.5	56 DAT	11-Oct-12	05-Nov-12	0.15
12-0419-354	2.5	56 DAT	11-Oct-12	05-Nov-12	0.13
12-0419-366	2.5	56 DAT	11-Oct-12	05-Nov-12	0.12
12-0419-378	2.5	56 DAT	11-Oct-12	05-Nov-12	0.013

Cont...

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Table 3 (Continued) Residues of buparvaquone in bovine kidney following treatment with BUTALEX

Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
120419-390	2.5	70 DAT	25-Oct-12	05-Dec-12	0.083
120419-402	2.5	70 DAT	25-Oct-12	05-Dec-12	0.046
120419-414	2.5	70 DAT	25-Oct-12	05-Dec-12	0.096
120419-426	2.5	70 DAT	25-Oct-12	05-Dec-12	0.066
120419-438	2.5	70 DAT	25-Oct-12	05-Dec-12	0.11
120419-450	2.5	70 DAT	25-Oct-12	05-Dec-12	0.089
120419-462	2.5	84 DAT	08-Nov-12	05-Dec-12	0.052
120419-474	2.5	84 DAT	08-Nov-12	05-Dec-12	0.080
120419-486	2.5	84 DAT	08-Nov-12	05-Dec-12	0.054
120419-498	2.5	84 DAT	08-Nov-12	05-Dec-12	0.090
120419-510	2.5	84 DAT	08-Nov-12	05-Dec-12	0.065
120419-522	2.5	84 DAT	08-Nov-12	05-Dec-12	0.079
120419-534	2.5	98 DAT	22-Nov-12	05-Dec-12	0.068
120419-546	2.5	98 DAT	22-Nov-12	05-Dec-12	0.051
120419-558	2.5	98 DAT	22-Nov-12	05-Dec-12	0.013
120419-570	2.5	98 DAT	22-Nov-12	05-Dec-12	0.027
120419-582	2.5	98 DAT	22-Nov-12	05-Dec-12	0.023
120419-594	2.5	98 DAT	22-Nov-12	05-Dec-12	0.060
12-0419-606	2.5	119 DAT	13-Dec-12	15-Jan-13	0.015
12-0419-618	2.5	119 DAT	13-Dec-12	15-Jan-13	0.031
12-0419-630	2.5	119 DAT	13-Dec-12	15-Jan-13	0.023
12-0419-642	2.5	119 DAT	13-Dec-12	15-Jan-13	0.033
12-0419-654	2.5	119 DAT	13-Dec-12	15-Jan-13	0.054
12-0419-666	2.5	119 DAT	13-Dec-12	15-Jan-13	0.026
12-0419-678	2.5	147 DAT	10-Jan-13	24-Jan-13	0.013
12-0419-690	2.5	147 DAT	10-Jan-13	24-Jan-13	0.033
12-0419-702	2.5	147 DAT	10-Jan-13	24-Jan-13	0.024
12-0419-714	2.5	147 DAT	10-Jan-13	24-Jan-13	0.038
12-0419-726	2.5	147 DAT	10-Jan-13	24-Jan-13	0.009*
12-0419-738	2.5	147 DAT	10-Jan-13	24-Jan-13	0.034

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Note: Results marked with * are between LOD and LOQ, as the reported values are less than the LOQ, by definition, their accuracy and precision cannot be verified.

Table 4 Residues of buparvaquone in bovine muscle following treatment with BUTALEX

Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
12-0419-03	2.5	-80 DAT	28-May-12	08-Nov-12	<LOD
12-0419-15	2.5	6 DAT	22-Aug-12	08-Nov-12	<LOD
12-0419-27	2.5	7 DAT	23-Aug-12	08-Nov-12	0.017
12-0419-39	2.5	7 DAT	23-Aug-12	08-Nov-12	0.015
12-0419-51	2.5	7 DAT	23-Aug-12	08-Nov-12	0.015
12-0419-63	2.5	7 DAT	23-Aug-12	08-Nov-12	0.010
12-0419-75	2.5	7 DAT	23-Aug-12	08-Nov-12	0.016
12-0419-87	2.5	7 DAT	23-Aug-12	08-Nov-12	0.016
12-0419-99	2.5	14 DAT	30-Aug-12	08-Nov-12	0.014
12-0419-111	2.5	14 DAT	30-Aug-12	08-Nov-12	0.013
12-0419-123	2.5	14 DAT	30-Aug-12	08-Nov-12	0.014
12-0419-135	2.5	14 DAT	30-Aug-12	08-Nov-12	0.016
12-0419-147	2.5	14 DAT	30-Aug-12	08-Nov-12	0.013
12-0419-159	2.5	14 DAT	30-Aug-12	08-Nov-12	0.017
12-0419-171	2.5	28 DAT	13-Sep-12	08-Nov-12	0.013
12-0419-183	2.5	28 DAT	13-Sep-12	08-Nov-12	0.013
12-0419-195	2.5	28 DAT	13-Sep-12	08-Nov-12	<LOD
12-0419-207	2.5	28 DAT	13-Sep-12	08-Nov-12	0.013
12-0419-219	2.5	28 DAT	13-Sep-12	08-Nov-12	0.016
12-0419-231	2.5	28 DAT	13-Sep-12	08-Nov-12	0.009*
12-0419-243	2.5	42 DAT	27-Sep-12	08-Nov-12	0.014
12-0419-255	2.5	42 DAT	27-Sep-12	08-Nov-12	<LOD
12-0419-267	2.5	42 DAT	27-Sep-12	08-Nov-12	0.010
12-0419-279	2.5	42 DAT	27-Sep-12	08-Nov-12	0.012
12-0419-291	2.5	42 DAT	27-Sep-12	08-Nov-12	0.012
12-0419-303	2.5	42 DAT	27-Sep-12	08-Nov-12	0.010
12-0419-315	2.5	56 DAT	11-Oct-12	08-Nov-12	<LOD
12-0419-327	2.5	56 DAT	11-Oct-12	08-Nov-12	<LOD
12-0419-339	2.5	56 DAT	11-Oct-12	08-Nov-12	0.009*
12-0419-351	2.5	56 DAT	11-Oct-12	08-Nov-12	0.009*
12-0419-363	2.5	56 DAT	11-Oct-12	08-Nov-12	0.006*
12-0419-375	2.5	56 DAT	11-Oct-12	08-Nov-12	<LOD

Cont...

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Note: Results marked with * are between LOD and LOQ, as the reported values are less than the LOQ, by definition, their accuracy and precision cannot be verified.

Table 4 (Continued) Residues of buparvaquone in bovine muscle following treatment with BUTALEX

Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
120419-387	2.5	70 DAT	25-Oct-12	04-Dec-12	0.007*
120419-399	2.5	70 DAT	25-Oct-12	04-Dec-12	<LOD
120419-411	2.5	70 DAT	25-Oct-12	04-Dec-12	0.010
120419-423	2.5	70 DAT	25-Oct-12	04-Dec-12	0.005*
120419-435	2.5	70 DAT	25-Oct-12	04-Dec-12	0.008*
120419-447	2.5	70 DAT	25-Oct-12	04-Dec-12	0.007*
120419-459	2.5	84 DAT	08-Nov-12	04-Dec-12	<LOD
120419-471	2.5	84 DAT	08-Nov-12	04-Dec-12	0.007*
120419-483	2.5	84 DAT	08-Nov-12	04-Dec-12	<LOD
120419-495	2.5	84 DAT	08-Nov-12	04-Dec-12	0.008*
120419-507	2.5	84 DAT	08-Nov-12	04-Dec-12	0.008*
120419-519	2.5	84 DAT	08-Nov-12	04-Dec-12	0.007*
120419-531	2.5	98 DAT	22-Nov-12	04-Dec-12	0.006*
120419-543	2.5	98 DAT	22-Nov-12	04-Dec-12	0.006*
120419-555	2.5	98 DAT	22-Nov-12	04-Dec-12	<LOD
120419-567	2.5	98 DAT	22-Nov-12	04-Dec-12	<LOD
120419-579	2.5	98 DAT	22-Nov-12	04-Dec-12	<LOD
120419-591	2.5	98 DAT	22-Nov-12	04-Dec-12	0.006*
12-0419-603	2.5	119 DAT	13-Dec-12	11-Jan-13	<LOD
12-0419-615	2.5	119 DAT	13-Dec-12	11-Jan-13	<LOD
12-0419-627	2.5	119 DAT	13-Dec-12	11-Jan-13	<LOD
12-0419-639	2.5	119 DAT	13-Dec-12	11-Jan-13	<LOD
12-0419-651	2.5	119 DAT	13-Dec-12	11-Jan-13	<LOD
12-0419-663	2.5	119 DAT	13-Dec-12	11-Jan-13	<LOD
12-0419-675	2.5	147 DAT	10-Jan-13	24-Jan-13	<LOD
12-0419-687	2.5	147 DAT	10-Jan-13	24-Jan-13	<LOD
12-0419-699	2.5	147 DAT	10-Jan-13	24-Jan-13	<LOD
12-0419-711	2.5	147 DAT	10-Jan-13	24-Jan-13	<LOD
12-0419-723	2.5	147 DAT	10-Jan-13	24-Jan-13	<LOD
12-0419-735	2.5	147 DAT	10-Jan-13	24-Jan-13	<LOD

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Note: Results marked with * are between LOD and LOQ, as the reported values are less than the LOQ, by definition, their accuracy and precision cannot be verified.

Table 5 Residues of buparvaquone in bovine neck muscle following treatment with BUTALEX

Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
12-0419-01	2.5	-80 DAT	28-May-12	08-Nov-12	<LOD
12-0419-13	2.5	6 DAT	22-Aug-12	08-Nov-12	<LOD
12-0419-25	2.5	7 DAT	23-Aug-12	08-Nov-12	734.8
12-0419-37	2.5	7 DAT	23-Aug-12	08-Nov-12	158.0
12-0419-49	2.5	7 DAT	23-Aug-12	08-Nov-12	34.2
12-0419-61	2.5	7 DAT	23-Aug-12	08-Nov-12	140.5
12-0419-73	2.5	7 DAT	23-Aug-12	08-Nov-12	1159.0
12-0419-85	2.5	7 DAT	23-Aug-12	08-Nov-12	232.5
12-0419-97	2.5	14 DAT	30-Aug-12	08-Nov-12	715.6
12-0419-109	2.5	14 DAT	30-Aug-12	08-Nov-12	103.5
12-0419-121	2.5	14 DAT	30-Aug-12	08-Nov-12	458.1
12-0419-133	2.5	14 DAT	30-Aug-12	08-Nov-12	205.9
12-0419-145	2.5	14 DAT	30-Aug-12	08-Nov-12	309.2
12-0419-157	2.5	14 DAT	30-Aug-12	08-Nov-12	539.3
12-0419-169	2.5	28 DAT	13-Sep-12	08-Nov-12	305.4
12-0419-181	2.5	28 DAT	13-Sep-12	08-Nov-12	228.8
12-0419-193	2.5	28 DAT	13-Sep-12	08-Nov-12	0.36
12-0419-205	2.5	28 DAT	13-Sep-12	08-Nov-12	111.5
12-0419-217	2.5	28 DAT	13-Sep-12	08-Nov-12	194.4
12-0419-229	2.5	28 DAT	13-Sep-12	08-Nov-12	242.9
12-0419-241	2.5	42 DAT	27-Sep-12	08-Nov-12	67.8
12-0419-253	2.5	42 DAT	27-Sep-12	08-Nov-12	1.20 (0.86)
12-0419-265	2.5	42 DAT	27-Sep-12	08-Nov-12	36.7
12-0419-277	2.5	42 DAT	27-Sep-12	08-Nov-12	235.0
12-0419-289	2.5	42 DAT	27-Sep-12	08-Nov-12	70.1
12-0419-301	2.5	42 DAT	27-Sep-12	08-Nov-12	90.0
12-0419-313	2.5	56 DAT	11-Oct-12	08-Nov-12	10.3
12-0419-325	2.5	56 DAT	11-Oct-12	08-Nov-12	43.2 (35.8)
12-0419-337	2.5	56 DAT	11-Oct-12	08-Nov-12	132.2
12-0419-349	2.5	56 DAT	11-Oct-12	08-Nov-12	11.5
12-0419-361	2.5	56 DAT	11-Oct-12	08-Nov-12	11.6
12-0419-373	2.5	56 DAT	11-Oct-12	08-Nov-12	4.36

Cont...

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Note: Results in parentheses are duplicate results.

Table 5 (Continued) Residues of buparvaquone in bovine neck muscle following treatment with BUTALEX

Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
120419-385	2.5	70 DAT	25-Oct-12	10-Dec-12	57.2
120419-397	2.5	70 DAT	25-Oct-12	10-Dec-12	29.8 (18.9)
120419-409	2.5	70 DAT	25-Oct-12	10-Dec-12	36.7
120419-421	2.5	70 DAT	25-Oct-12	10-Dec-12	38.3
120419-433	2.5	70 DAT	25-Oct-12	10-Dec-12	30.5
120419-445	2.5	70 DAT	25-Oct-12	10-Dec-12	25.1
120419-457	2.5	84 DAT	08-Nov-12	10-Dec-12	1.95
120419-469	2.5	84 DAT	08-Nov-12	10-Dec-12	65.8
120419-481	2.5	84 DAT	08-Nov-12	10-Dec-12	30.9
120419-493	2.5	84 DAT	08-Nov-12	10-Dec-12	9.41
120419-505	2.5	84 DAT	08-Nov-12	10-Dec-12	8.15 (9.78)
120419-517	2.5	84 DAT	08-Nov-12	10-Dec-12	78.7
120419-529	2.5	98 DAT	22-Nov-12	10-Dec-12	72.6
120419-541	2.5	98 DAT	22-Nov-12	10-Dec-12	62.5
120419-553	2.5	98 DAT	22-Nov-12	10-Dec-12	3.53 (5.31)
120419-565	2.5	98 DAT	22-Nov-12	10-Dec-12	0.085
120419-577	2.5	98 DAT	22-Nov-12	10-Dec-12	0.012
120419-589	2.5	98 DAT	22-Nov-12	10-Dec-12	14.9
12-0419-601	2.5	119 DAT	13-Dec-12	11-Jan-13	0.031
12-0419-613	2.5	119 DAT	13-Dec-12	14-Jan-13	12.8
12-0419-625	2.5	119 DAT	13-Dec-12	14-Jan-13	29.5
12-0419-637	2.5	119 DAT	13-Dec-12	14-Jan-13	60.5
12-0419-649	2.5	119 DAT	13-Dec-12	14-Jan-13	41.1
12-0419-661	2.5	119 DAT	13-Dec-12	14-Jan-13	9.83
12-0419-673	2.5	147 DAT	10-Jan-13	04-Feb-13	5.68
12-0419-685	2.5	147 DAT	10-Jan-13	04-Feb-13	67.7
12-0419-697	2.5	147 DAT	10-Jan-13	04-Feb-13	9.12
12-0419-709	2.5	147 DAT	10-Jan-13	04-Feb-13	101.1
12-0419-721	2.5	147 DAT	10-Jan-13	04-Feb-13	2.79
12-0419-733	2.5	147 DAT	10-Jan-13	04-Feb-13	18.6

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Note: Results in parentheses are duplicate results.

Table 6 Residues of Buparvaquone in bovine back fat following treatment with BUTALEX

Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
12-0419-2	2.5	-80 DAT	28-May-12	31-Oct-12	<LOD
12-0419-14	2.5	6 DAT	22-Aug-12	31-Oct-12	<LOD
12-0419-26	2.5	7 DAT	23-Aug-12	31-Oct-12	0.13
12-0419-38	2.5	7 DAT	23-Aug-12	31-Oct-12	0.12
12-0419-50	2.5	7 DAT	23-Aug-12	31-Oct-12	0.099
12-0419-62	2.5	7 DAT	23-Aug-12	31-Oct-12	0.15
12-0419-74	2.5	7 DAT	23-Aug-12	31-Oct-12	0.091
12-0419-86	2.5	7 DAT	23-Aug-12	31-Oct-12	0.11
12-0419-98	2.5	14 DAT	30-Aug-12	31-Oct-12	0.088
12-0419-110	2.5	14 DAT	30-Aug-12	31-Oct-12	0.050
12-0419-122	2.5	14 DAT	30-Aug-12	31-Oct-12	0.068
12-0419-134	2.5	14 DAT	30-Aug-12	31-Oct-12	0.10
12-0419-146	2.5	14 DAT	30-Aug-12	31-Oct-12	0.079
12-0419-158	2.5	14 DAT	30-Aug-12	31-Oct-12	0.087
12-0419-170	2.5	28 DAT	13-Sep-12	31-Oct-12	0.041
12-0419-182	2.5	28 DAT	13-Sep-12	31-Oct-12	0.050
12-0419-194	2.5	28 DAT	13-Sep-12	31-Oct-12	0.006*
12-0419-206	2.5	28 DAT	13-Sep-12	31-Oct-12	0.045
12-0419-218	2.5	28 DAT	13-Sep-12	31-Oct-12	0.055
12-0419-230	2.5	28 DAT	13-Sep-12	31-Oct-12	0.044
12-0419-242	2.5	42 DAT	27-Sep-12	31-Oct-12	0.026
12-0419-254	2.5	42 DAT	27-Sep-12	31-Oct-12	0.011
12-0419-266	2.5	42 DAT	27-Sep-12	31-Oct-12	0.012
12-0419-278	2.5	42 DAT	27-Sep-12	31-Oct-12	0.059
12-0419-290	2.5	42 DAT	27-Sep-12	31-Oct-12	0.015
12-0419-302	2.5	42 DAT	27-Sep-12	31-Oct-12	0.016
12-0419-314	2.5	56 DAT	11-Oct-12	31-Oct-12	<LOD
12-0419-326	2.5	56 DAT	11-Oct-12	31-Oct-12	0.013
12-0419-338	2.5	56 DAT	11-Oct-12	31-Oct-12	0.022
12-0419-350	2.5	56 DAT	11-Oct-12	31-Oct-12	0.018
12-0419-362	2.5	56 DAT	11-Oct-12	31-Oct-12	0.017
12-0419-374	2.5	56 DAT	11-Oct-12	31-Oct-12	<LOD

Cont...

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Note: Results marked with * are between LOD and LOQ, as the reported values are less than the LOQ, by definition, their accuracy and precision cannot be verified.

Table 6 (Continued) Residues of buparvaquone in bovine back fat following treatment with BUTALEX

Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
120419-386	2.5	70 DAT	25-Oct-12	03-Dec-12	0.012
120419-398	2.5	70 DAT	25-Oct-12	03-Dec-12	0.006*
120419-410	2.5	70 DAT	25-Oct-12	03-Dec-12	0.014
120419-422	2.5	70 DAT	25-Oct-12	03-Dec-12	0.008*
120419-434	2.5	70 DAT	25-Oct-12	03-Dec-12	0.015
120419-446	2.5	70 DAT	25-Oct-12	03-Dec-12	0.016
120419-458	2.5	84 DAT	08-Nov-12	03-Dec-12	0.008*
120419-470	2.5	84 DAT	08-Nov-12	03-Dec-12	0.017
120419-482	2.5	84 DAT	08-Nov-12	03-Dec-12	0.007*
120419-494	2.5	84 DAT	08-Nov-12	03-Dec-12	0.016
120419-506	2.5	84 DAT	08-Nov-12	03-Dec-12	0.012
120419-518	2.5	84 DAT	08-Nov-12	03-Dec-12	0.015
120419-530	2.5	98 DAT	22-Nov-12	03-Dec-12	0.010
120419-542	2.5	98 DAT	22-Nov-12	03-Dec-12	0.006*
120419-554	2.5	98 DAT	22-Nov-12	03-Dec-12	<LOD
120419-566	2.5	98 DAT	22-Nov-12	03-Dec-12	<LOD
120419-578	2.5	98 DAT	22-Nov-12	03-Dec-12	<LOD
120419-590	2.5	98 DAT	22-Nov-12	03-Dec-12	0.011
12-0419-602	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0419-614	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0419-626	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0419-638	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0419-650	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0419-662	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0419-674	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD
12-0419-686	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD
12-0419-698	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD
12-0419-710	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD
12-0419-722	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD
12-0419-734	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Note: Results marked with * are between LOD and LOQ, as the reported values are less than the LOQ, by definition, their accuracy and precision cannot be verified.

Table 7 Residues of buparvaquone in bovine perirenal fat following treatment with BUTALEX

Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
12-0419-05	2.5	-80 DAT	28-May-12	01-Nov-12	<LOD
12-0419-17	2.5	6 DAT	22-Aug-12	01-Nov-12	<LOD
12-0419-29	2.5	7 DAT	23-Aug-12	01-Nov-12	0.11
12-0419-41	2.5	7 DAT	23-Aug-12	01-Nov-12	0.12
12-0419-53	2.5	7 DAT	23-Aug-12	01-Nov-12	0.15
12-0419-65	2.5	7 DAT	23-Aug-12	01-Nov-12	0.16
12-0419-77	2.5	7 DAT	23-Aug-12	01-Nov-12	0.11
12-0419-89	2.5	7 DAT	23-Aug-12	01-Nov-12	0.085
12-0419-101	2.5	14 DAT	30-Aug-12	01-Nov-12	0.054
12-0419-113	2.5	14 DAT	30-Aug-12	01-Nov-12	0.063
12-0419-125	2.5	14 DAT	30-Aug-12	01-Nov-12	0.090
12-0419-137	2.5	14 DAT	30-Aug-12	01-Nov-12	0.097
12-0419-149	2.5	14 DAT	30-Aug-12	01-Nov-12	0.094
12-0419-161	2.5	14 DAT	30-Aug-12	01-Nov-12	0.090
12-0419-173	2.5	28 DAT	13-Sep-12	01-Nov-12	0.047
12-0419-185	2.5	28 DAT	13-Sep-12	01-Nov-12	0.049
12-0419-197	2.5	28 DAT	13-Sep-12	01-Nov-12	0.005*
12-0419-209	2.5	28 DAT	13-Sep-12	01-Nov-12	0.045
12-0419-221	2.5	28 DAT	13-Sep-12	01-Nov-12	0.050
12-0419-233	2.5	28 DAT	13-Sep-12	01-Nov-12	0.044
12-0419-245	2.5	42 DAT	27-Sep-12	01-Nov-12	0.028
12-0419-257	2.5	42 DAT	27-Sep-12	01-Nov-12	0.011
12-0419-269	2.5	42 DAT	27-Sep-12	01-Nov-12	0.018
12-0419-281	2.5	42 DAT	27-Sep-12	01-Nov-12	0.061
12-0419-293	2.5	42 DAT	27-Sep-12	01-Nov-12	0.019
12-0419-305	2.5	42 DAT	27-Sep-12	01-Nov-12	0.020
12-0419-317	2.5	56 DAT	11-Oct-12	01-Nov-12	<LOD
12-0419-329	2.5	56 DAT	11-Oct-12	01-Nov-12	0.008*
12-0419-341	2.5	56 DAT	11-Oct-12	01-Nov-12	0.017
12-0419-353	2.5	56 DAT	11-Oct-12	01-Nov-12	0.008*
12-0419-365	2.5	56 DAT	11-Oct-12	01-Nov-12	0.009*
12-0419-377	2.5	56 DAT	11-Oct-12	01-Nov-12	<LOD

Cont...

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Note: Results marked with * are between LOD and LOQ, as the reported values are less than the LOQ, by definition, their accuracy and precision cannot be verified.

Table 7 (Continued) Residues of buparvaquone in bovine perirenal fat following treatment with BUTALEX

Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
120419-389	2.5	70 DAT	25-Oct-12	03-Dec-12	<LOD
120419-401	2.5	70 DAT	25-Oct-12	03-Dec-12	<LOD
120419-413	2.5	70 DAT	25-Oct-12	03-Dec-12	0.007*
120419-425	2.5	70 DAT	25-Oct-12	03-Dec-12	<LOD
120419-437	2.5	70 DAT	25-Oct-12	03-Dec-12	0.007*
120419-449	2.5	70 DAT	25-Oct-12	03-Dec-12	0.006*
120419-461	2.5	84 DAT	08-Nov-12	03-Dec-12	<LOD
120419-473	2.5	84 DAT	08-Nov-12	03-Dec-12	0.006*
120419-485	2.5	84 DAT	08-Nov-12	03-Dec-12	<LOD
120419-497	2.5	84 DAT	08-Nov-12	03-Dec-12	0.007*
120419-509	2.5	84 DAT	08-Nov-12	03-Dec-12	0.006*
120419-521	2.5	84 DAT	08-Nov-12	03-Dec-12	<LOD
120419-533	2.5	98 DAT	22-Nov-12	03-Dec-12	0.007*
120419-545	2.5	98 DAT	22-Nov-12	03-Dec-12	<LOD
120419-557	2.5	98 DAT	22-Nov-12	03-Dec-12	<LOD
120419-569	2.5	98 DAT	22-Nov-12	03-Dec-12	<LOD
120419-581	2.5	98 DAT	22-Nov-12	03-Dec-12	<LOD
120419-593	2.5	98 DAT	22-Nov-12	03-Dec-12	0.005*
12-0419-605	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0419-617	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0419-629	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0419-641	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0419-653	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0419-665	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0419-677	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD
12-0419-689	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD
12-0419-701	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD
12-0419-713	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD
12-0419-725	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD
12-0419-737	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Note: Results marked with * are between LOD and LOQ, as the reported values are less than the LOQ, by definition, their accuracy and precision cannot be verified.

19 Conclusion

Quantifiable residues of buparvaquone (>0.01 mg/kg) were found in all of the supplied samples of bovine tissue following application of BUTALEX (50 mg/mL Buparvaquone) at 5 mL/100 kg via intramuscular injection on Day -2 and Day 0 for the liver, kidney and neck muscle (injection site) samples.

The range of residues found in the tissue samples at each sampling point are presented in the table below:

DAT	Buparvaquone mg/kg					
	Neck Muscle	Muscle	Liver	Kidney	Perirenal Fat	Back Fat
7	34.2 - 1159.0	0.010 - 0.017	1.25 - 1.49	0.29 - 0.34	0.085 - 0.16	0.091 - 0.15
14	103.5 - 715.6	0.013 - 0.017	1.31 - 1.60	0.26 - 0.31	0.054 - 0.097	0.050 - 0.10
28	0.36 - 305.4	<LOD - 0.016	0.40 - 1.51	0.073 - 0.24	0.005* - 0.050	0.006* - 0.055
42	1.20 - 235.0	<LOD - 0.014	0.80 - 1.40	0.12 - 0.25	0.011 - 0.061	0.011 - 0.059
56	4.36 - 132.2	<LOD - 0.009*	0.089 - 0.88	0.013 - 0.15	<LOD - 0.017	<LOD - 0.022
70	25.1 - 57.2	<LOD - 0.010	0.17 - 0.35	0.046 - 011	<LOD - 0.007*	0.006* - 0.016
84	1.95 - 78.7	<LOD - 0.008*	0.14 - 0.29	0.052 - 0.090	<LOD - 0.007*	0.007* - 0.017
98	0.012 - 72.6	<LOD - 0.006*	0.061 - 0.25	0.013 - 0.068	<LOD - 0.007*	<LOD - 0.011
119	0.031 - 60.5	All <LOD	0.073 - 0.17	0.015 - 0.054	All <LOD	All <LOD
147	2.79 - 101.1	All <LOD	0.040 - 0.20	0.009* - 0.038	All <LOD	All <LOD

LOD = Limit of detection = 0.005 mg/kg
LOQ = Limit of quantitation = 0.01 mg/kg
DAT = Days After Treatment

Note: Results marked with * are between the LOD and LOQ, as the reported values are less than the LOQ, by definition, their accuracy and precision cannot be verified.

All bovine tissue samples for perirenal fat, back fat and muscle were below the limit of detection (0.005 mg/kg) at 119 days post-treatment. Only the kidneys were beginning to decrease below the quantifiable level at Day 147 for one sample collected, all other samples in the kidneys, liver and neck muscle were above this level.

The withholding period for this product is 42 days internationally[1], although the evidence gathered from this trial shows that the level of buparvaquone still in the bovine tissues at 42 days is quite high.

[1]This data was collected from the label of the Butalex chemical made by Coopers Animal Health.

20 Archived records

The Study Plan, Standard Operating Procedures, Field Trial Notebook, Study Director's Logbook, Facility Logbook, Analytical Report, Final Report and Quality Assurance reports for the study will be archived at Agrisearch Services Pty Ltd at Orange, New South Wales, Australia.

The analytical raw data and a copy of the Agrisearch Analytical Pty Ltd report will be stored in the archive room at Agrisearch Analytical Pty Ltd. The reference item will be stored in the Agrisearch Analytical Pty Ltd laboratory under controlled conditions.

21 Appendices

21.1 Keylist

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	1	120419-1	W 1-1	P	Neck Muscle	-80 DAT	UTC	nil	nil	Angus X	28-May-12
120419	2	120419-2	W 1-1	P	Back fat	-80 DAT	UTC	nil	nil	Angus X	28-May-12
120419	3	120419-3	W 1-1	P	Muscle	-80 DAT	UTC	nil	nil	Angus X	28-May-12
120419	4	120419-4	W 1-1	P	Liver	-80 DAT	UTC	nil	nil	Angus X	28-May-12
120419	5	120419-5	W 1-1	P	Perirenal fat	-80 DAT	UTC	nil	nil	Angus X	28-May-12
120419	6	120419-6	W 1-1	P	Kidney	-80 DAT	UTC	nil	nil	Angus X	28-May-12
120419	7	120419-7	W 1-1	R	Neck Muscle	-80 DAT	UTC	nil	nil	Angus X	28-May-12
120419	8	120419-8	W 1-1	R	Back fat	-80 DAT	UTC	nil	nil	Angus X	28-May-12
120419	9	120419-9	W 1-1	R	Muscle	-80 DAT	UTC	nil	nil	Angus X	28-May-12
120419	10	120419-10	W 1-1	R	Liver	-80 DAT	UTC	nil	nil	Angus X	28-May-12
120419	11	120419-11	W 1-1	R	Perirenal fat	-80 DAT	UTC	nil	nil	Angus X	28-May-12
120419	12	120419-12	W 1-1	R	Kidney	-80 DAT	UTC	nil	nil	Angus X	28-May-12
120419	13	120419-13	W 1-2	P	Neck Muscle	6 DAT	UTC	nil	nil	Angus X	22-Aug-12
120419	14	120419-14	W 1-2	P	Back fat	6 DAT	UTC	nil	nil	Angus X	22-Aug-12
120419	15	120419-15	W 1-2	P	Muscle	6 DAT	UTC	nil	nil	Angus X	22-Aug-12
120419	16	120419-16	W 1-2	P	Liver	6 DAT	UTC	nil	nil	Angus X	22-Aug-12
120419	17	120419-17	W 1-2	P	Perirenal fat	6 DAT	UTC	nil	nil	Angus X	22-Aug-12
120419	18	120419-18	W 1-2	P	Kidney	6 DAT	UTC	nil	nil	Angus X	22-Aug-12
120419	19	120419-19	W 1-2	R	Neck Muscle	6 DAT	UTC	nil	nil	Angus X	22-Aug-12
120419	20	120419-20	W 1-2	R	Back fat	6 DAT	UTC	nil	nil	Angus X	22-Aug-12
120419	21	120419-21	W 1-2	R	Muscle	6 DAT	UTC	nil	nil	Angus X	22-Aug-12
120419	22	120419-22	W 1-2	R	Liver	6 DAT	UTC	nil	nil	Angus X	22-Aug-12
120419	23	120419-23	W 1-2	R	Perirenal fat	6 DAT	UTC	nil	nil	Angus X	22-Aug-12
120419	24	120419-24	W 1-2	R	Kidney	6 DAT	UTC	nil	nil	Angus X	22-Aug-12
120419	25	120419-25	R 2-1	P	Neck Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	26	120419-26	R 2-1	P	Back fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	27	120419-27	R 2-1	P	Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	28	120419-28	R 2-1	P	Liver	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	29	120419-29	R 2-1	P	Perirenal fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	30	120419-30	R 2-1	P	Kidney	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	31	120419-31	R 2-1	R	Neck Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	32	120419-32	R 2-1	R	Back fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	33	120419-33	R 2-1	R	Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	34	120419-34	R 2-1	R	Liver	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	35	120419-35	R 2-1	R	Perirenal fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	36	120419-36	R 2-1	R	Kidney	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	37	120419-37	R 2-2	P	Neck Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	38	120419-38	R 2-2	P	Back fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	39	120419-39	R 2-2	P	Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	40	120419-40	R 2-2	P	Liver	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	41	120419-41	R 2-2	P	Perirenal fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	42	120419-42	R 2-2	P	Kidney	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	43	120419-43	R 2-2	R	Neck Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	44	120419-44	R 2-2	R	Back fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	45	120419-45	R 2-2	R	Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	46	120419-46	R 2-2	R	Liver	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	47	120419-47	R 2-2	R	Perirenal fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	48	120419-48	R 2-2	R	Kidney	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	49	120419-49	R 2-3	P	Neck Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	50	120419-50	R 2-3	P	Back fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	51	120419-51	R 2-3	P	Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	52	120419-52	R 2-3	P	Liver	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	53	120419-53	R 2-3	P	Perirenal fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	54	120419-54	R 2-3	P	Kidney	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	55	120419-55	R 2-3	R	Neck Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	56	120419-56	R 2-3	R	Back fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	57	120419-57	R 2-3	R	Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	58	120419-58	R 2-3	R	Liver	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	59	120419-59	R 2-3	R	Perirenal fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	60	120419-60	R 2-3	R	Kidney	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	61	120419-61	R 2-4	P	Neck Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	62	120419-62	R 2-4	P	Back fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	63	120419-63	R 2-4	P	Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	64	120419-64	R 2-4	P	Liver	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	65	120419-65	R 2-4	P	Perirenal fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	66	120419-66	R 2-4	P	Kidney	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	67	120419-67	R 2-4	R	Neck Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	68	120419-68	R 2-4	R	Back fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	69	120419-69	R 2-4	R	Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	70	120419-70	R 2-4	R	Liver	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	71	120419-71	R 2-4	R	Perirenal fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	72	120419-72	R 2-4	R	Kidney	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	73	120419-73	R 2-5	P	Neck Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	74	120419-74	R 2-5	P	Back fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	75	120419-75	R 2-5	P	Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	76	120419-76	R 2-5	P	Liver	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	77	120419-77	R 2-5	P	Perirenal fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	78	120419-78	R 2-5	P	Kidney	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	79	120419-79	R 2-5	R	Neck Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	80	120419-80	R 2-5	R	Back fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	81	120419-81	R 2-5	R	Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	82	120419-82	R 2-5	R	Liver	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	83	120419-83	R 2-5	R	Perirenal fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	84	120419-84	R 2-5	R	Kidney	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	85	120419-85	R 2-6	P	Neck Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	86	120419-86	R 2-6	P	Back fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	87	120419-87	R 2-6	P	Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	88	120419-88	R 2-6	P	Liver	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	89	120419-89	R 2-6	P	Perirenal fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	90	120419-90	R 2-6	P	Kidney	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	91	120419-91	R 2-6	R	Neck Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	92	120419-92	R 2-6	R	Back fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	93	120419-93	R 2-6	R	Muscle	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	94	120419-94	R 2-6	R	Liver	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	95	120419-95	R 2-6	R	Perirenal fat	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	96	120419-96	R 2-6	R	Kidney	7 DAT	BUTALEX	5mL/100kg	Solution	Angus X	23-Aug-12
120419	97	120419-97	O 3 -1	P	Neck Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	98	120419-98	O 3 -1	P	Back fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	99	120419-99	O 3 -1	P	Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	100	120419-100	O 3 -1	P	Liver	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	101	120419-101	O 3 -1	P	Perirenal fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	102	120419-102	O 3 -1	P	Kidney	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	103	120419-103	O 3 -1	R	Neck Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	104	120419-104	O 3 -1	R	Back fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	105	120419-105	O 3 -1	R	Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	106	120419-106	O 3 -1	R	Liver	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	107	120419-107	O 3 -1	R	Perirenal fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	108	120419-108	O 3 -1	R	Kidney	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	109	120419-109	O 3-2	P	Neck Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	110	120419-110	O 3-2	P	Back fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	111	120419-111	O 3-2	P	Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	112	120419-112	O 3-2	P	Liver	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	113	120419-113	O 3-2	P	Perirenal fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	114	120419-114	O 3-2	P	Kidney	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	115	120419-115	O 3-2	R	Neck Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	116	120419-116	O 3-2	R	Back fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	117	120419-117	O 3-2	R	Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	118	120419-118	O 3-2	R	Liver	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	119	120419-119	O 3-2	R	Perirenal fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	120	120419-120	O 3-2	R	Kidney	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	121	120419-121	O 3-3	P	Neck Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	122	120419-122	O 3-3	P	Back fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	123	120419-123	O 3-3	P	Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	124	120419-	O 3-3	P	Liver	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	125	120419-125	O 3-3	P	Perirenal fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	126	120419-126	O 3-3	P	Kidney	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	127	120419-127	O 3-3	R	Neck Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	128	120419-128	O 3-3	R	Back fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	129	120419-129	O 3-3	R	Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	130	120419-130	O 3-3	R	Liver	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	131	120419-131	O 3-3	R	Perirenal fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	132	120419-132	O 3-3	R	Kidney	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	133	120419-133	O 3-4	P	Neck Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	134	120419-134	O 3-4	P	Back fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	135	120419-135	O 3-4	P	Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	136	120419-136	O 3-4	P	Liver	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	137	120419-137	O 3-4	P	Perirenal fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	138	120419-138	O 3-4	P	Kidney	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	139	120419-139	O 3-4	R	Neck Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	140	120419-140	O 3-4	R	Back fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	141	120419-141	O 3-4	R	Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	142	120419-142	O 3-4	R	Liver	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	143	120419-143	O 3-4	R	Perirenal fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	144	120419-144	O 3-4	R	Kidney	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	145	120419-145	O 3-5	P	Neck Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	146	120419-146	O 3-5	P	Back fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	147	120419-147	O 3-5	P	Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	148	120419-148	O 3-5	P	Liver	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	149	120419-149	O 3-5	P	Perirenal fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	150	120419-150	O 3-5	P	Kidney	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	151	120419-151	O 3-5	R	Neck Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	152	120419-152	O 3-5	R	Back fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	153	120419-153	O 3-5	R	Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	154	120419-154	O 3-5	R	Liver	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	155	120419-155	O 3-5	R	Perirenal fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	156	120419-156	O 3-5	R	Kidney	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	157	120419-157	O 3-6	P	Neck Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	158	120419-158	O 3-6	P	Back fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	159	120419-159	O 3-6	P	Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	160	120419-160	O 3-6	P	Liver	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	161	120419-161	O 3-6	P	Perirenal fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	162	120419-162	O 3-6	P	Kidney	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	163	120419-163	O 3-6	R	Neck Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	164	120419-164	O 3-6	R	Back fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	165	120419-165	O 3-6	R	Muscle	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	166	120419-166	O 3-6	R	Liver	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	167	120419-167	O 3-6	R	Perirenal fat	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	168	120419-168	O 3-6	R	Kidney	14 DAT	BUTALEX	5mL/100kg	Solution	Angus X	30-Aug-12
120419	169	120419-169	Y 4-1	P	Neck Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	170	120419-170	Y 4-1	P	Back fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	171	120419-171	Y 4-1	P	Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	172	120419-172	Y 4-1	P	Liver	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	173	120419-173	Y 4-1	P	Perirenal fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	174	120419-174	Y 4-1	P	Kidney	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	175	120419-175	Y 4-1	R	Neck Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	176	120419-176	Y 4-1	R	Back fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	177	120419-177	Y 4-1	R	Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	178	120419-178	Y 4-1	R	Liver	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	179	120419-179	Y 4-1	R	Perirenal fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	180	120419-180	Y 4-1	R	Kidney	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	181	120419-181	Y 4-2	P	Neck Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	182	120419-182	Y 4-2	P	Back fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	183	120419-183	Y 4-2	P	Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	184	120419-184	Y 4-2	P	Liver	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	185	120419-185	Y 4-2	P	Perirenal fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	186	120419-186	Y 4-2	P	Kidney	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	187	120419-187	Y 4-2	R	Neck Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	188	120419-188	Y 4-2	R	Back fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	189	120419-189	Y 4-2	R	Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	190	120419-190	Y 4-2	R	Liver	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	191	120419-191	Y 4-2	R	Perirenal fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	192	120419-192	Y 4-2	R	Kidney	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	193	120419-193	Y 4-3	P	Neck Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	194	120419-194	Y 4-3	P	Back fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	195	120419-195	Y 4-3	P	Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	196	120419-196	Y 4-3	P	Liver	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	197	120419-197	Y 4-3	P	Perirenal fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	198	120419-198	Y 4-3	P	Kidney	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	199	120419-199	Y 4-3	R	Neck Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	200	120419-200	Y 4-3	R	Back fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	201	120419-	Y 4-3	R	Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	202	120419-201	Y 4-3	R	Liver	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	203	120419-202	Y 4-3	R	Perirenal fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	204	120419-203	Y 4-3	R	Kidney	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	205	120419-204	Y 4-4	P	Neck Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	206	120419-205	Y 4-4	P	Back fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	207	120419-206	Y 4-4	P	Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	208	120419-207	Y 4-4	P	Liver	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	209	120419-208	Y 4-4	P	Perirenal fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	210	120419-209	Y 4-4	P	Kidney	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	211	120419-210	Y 4-4	R	Neck Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	212	120419-211	Y 4-4	R	Back fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	213	120419-212	Y 4-4	R	Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	214	120419-213	Y 4-4	R	Liver	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	215	120419-214	Y 4-4	R	Perirenal fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	216	120419-215	Y 4-4	R	Kidney	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	217	120419-216	Y 4-5	P	Neck Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	218	120419-217	Y 4-5	P	Back fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	219	120419-218	Y 4-5	P	Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	220	120419-219	Y 4-5	P	Liver	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	221	120419-220	Y 4-5	P	Perirenal fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	222	120419-221	Y 4-5	P	Kidney	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	223	120419-222	Y 4-5	R	Neck Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	224	120419-223	Y 4-5	R	Back fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	225	120419-224	Y 4-5	R	Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	226	120419-225	Y 4-5	R	Liver	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	227	120419-226	Y 4-5	R	Perirenal fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	228	120419-227	Y 4-5	R	Kidney	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	229	120419-228	Y 4-6	P	Neck Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	230	120419-229	Y 4-6	P	Back fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	231	120419-230	Y 4-6	P	Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	232	120419-231	Y 4-6	P	Liver	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	233	120419-232	Y 4-6	P	Perirenal fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	234	120419-233	Y 4-6	P	Kidney	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	235	120419-234	Y 4-6	R	Neck Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	236	120419-235	Y 4-6	R	Back fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	237	120419-236	Y 4-6	R	Muscle	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	238	120419-237	Y 4-6	R	Liver	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	239	120419-238	Y 4-6	R	Perirenal fat	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
		120419-239									

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	240	120419-240	Y 4-6	R	Kidney	28 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Sep-12
120419	241	120419-241	G 5-1	P	Neck Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	242	120419-242	G 5-1	P	Back fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	243	120419-243	G 5-1	P	Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	244	120419-244	G 5-1	P	Liver	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	245	120419-245	G 5-1	P	Perirenal fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	246	120419-246	G 5-1	P	Kidney	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	247	120419-247	G 5-1	R	Neck Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	248	120419-248	G 5-1	R	Back fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	249	120419-249	G 5-1	R	Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	250	120419-250	G 5-1	R	Liver	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	251	120419-251	G 5-1	R	Perirenal fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	252	120419-252	G 5-1	R	Kidney	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	253	120419-253	G 5-2	P	Neck Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	254	120419-254	G 5-2	P	Back fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	255	120419-255	G 5-2	P	Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	256	120419-256	G 5-2	P	Liver	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	257	120419-257	G 5-2	P	Perirenal fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	258	120419-258	G 5-2	P	Kidney	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	259	120419-259	G 5-2	R	Neck Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	260	120419-260	G 5-2	R	Back fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	261	120419-261	G 5-2	R	Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	262	120419-262	G 5-2	R	Liver	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	263	120419-263	G 5-2	R	Perirenal fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	264	120419-264	G 5-2	R	Kidney	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	265	120419-265	G 5-3	P	Neck Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	266	120419-266	G 5-3	P	Back fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	267	120419-267	G 5-3	P	Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	268	120419-268	G 5-3	P	Liver	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	269	120419-269	G 5-3	P	Perirenal fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	270	120419-270	G 5-3	P	Kidney	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	271	120419-271	G 5-3	R	Neck Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	272	120419-272	G 5-3	R	Back fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	273	120419-273	G 5-3	R	Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	274	120419-274	G 5-3	R	Liver	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	275	120419-275	G 5-3	R	Perirenal fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	276	120419-276	G 5-3	R	Kidney	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	277	120419-277	G 5-4	P	Neck Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	278	120419-	G 5-4	P	Back fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	279	120419-279	G 5-4	P	Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	280	120419-280	G 5-4	P	Liver	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	281	120419-281	G 5-4	P	Perirenal fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	282	120419-282	G 5-4	P	Kidney	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	283	120419-283	G 5-4	R	Neck Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	284	120419-284	G 5-4	R	Back fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	285	120419-285	G 5-4	R	Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	286	120419-286	G 5-4	R	Liver	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	287	120419-287	G 5-4	R	Perirenal fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	288	120419-288	G 5-4	R	Kidney	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	289	120419-289	G 5-5	P	Neck Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	290	120419-290	G 5-5	P	Back fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	291	120419-291	G 5-5	P	Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	292	120419-292	G 5-5	P	Liver	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	293	120419-293	G 5-5	P	Perirenal fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	294	120419-294	G 5-5	P	Kidney	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	295	120419-295	G 5-5	R	Neck Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	296	120419-296	G 5-5	R	Back fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	297	120419-297	G 5-5	R	Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	298	120419-298	G 5-5	R	Liver	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	299	120419-299	G 5-5	R	Perirenal fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	300	120419-300	G 5-5	R	Kidney	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	301	120419-301	G 5-6	P	Neck Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	302	120419-302	G 5-6	P	Back fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	303	120419-303	G 5-6	P	Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	304	120419-304	G 5-6	P	Liver	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	305	120419-305	G 5-6	P	Perirenal fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	306	120419-306	G 5-6	P	Kidney	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	307	120419-307	G 5-6	R	Neck Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	308	120419-308	G 5-6	R	Back fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	309	120419-309	G 5-6	R	Muscle	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	310	120419-310	G 5-6	R	Liver	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	311	120419-311	G 5-6	R	Perirenal fat	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	312	120419-312	G 5-6	R	Kidney	42 DAT	BUTALEX	5mL/100kg	Solution	Angus X	27-Sep-12
120419	313	120419-313	B 6 -1	P	Neck Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	314	120419-314	B 6 -1	P	Back fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	315	120419-315	B 6 -1	P	Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	316	120419-316	B 6 -1	P	Liver	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	317	120419-317	B 6 -1	P	Perirenal fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	318	120419-318	B 6 -1	P	Kidney	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	319	120419-319	B 6 -1	R	Neck Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	320	120419-320	B 6 -1	R	Back fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	321	120419-321	B 6 -1	R	Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	322	120419-322	B 6 -1	R	Liver	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	323	120419-323	B 6 -1	R	Perirenal fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	324	120419-324	B 6 -1	R	Kidney	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	325	120419-325	B 6-2	P	Neck Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	326	120419-326	B 6-2	P	Back fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	327	120419-327	B 6-2	P	Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	328	120419-328	B 6-2	P	Liver	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	329	120419-329	B 6-2	P	Perirenal fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	330	120419-330	B 6-2	P	Kidney	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	331	120419-331	B 6-2	R	Neck Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	332	120419-332	B 6-2	R	Back fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	333	120419-333	B 6-2	R	Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	334	120419-334	B 6-2	R	Liver	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	335	120419-335	B 6-2	R	Perirenal fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	336	120419-336	B 6-2	R	Kidney	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	337	120419-337	B 6-3	P	Neck Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	338	120419-338	B 6-3	P	Back fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	339	120419-339	B 6-3	P	Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	340	120419-340	B 6-3	P	Liver	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	341	120419-341	B 6-3	P	Perirenal fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	342	120419-342	B 6-3	P	Kidney	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	343	120419-343	B 6-3	R	Neck Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	344	120419-344	B 6-3	R	Back fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	345	120419-345	B 6-3	R	Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	346	120419-346	B 6-3	R	Liver	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	347	120419-347	B 6-3	R	Perirenal fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	348	120419-348	B 6-3	R	Kidney	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	349	120419-349	B 6-4	P	Neck Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	350	120419-350	B 6-4	P	Back fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	351	120419-351	B 6-4	P	Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	352	120419-352	B 6-4	P	Liver	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	353	120419-353	B 6-4	P	Perirenal fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	354	120419-354	B 6-4	P	Kidney	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	355	120419-	B 6-4	R	Neck Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	355	120419-356	B 6-4	R	Back fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	357	120419-357	B 6-4	R	Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	358	120419-358	B 6-4	R	Liver	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	359	120419-359	B 6-4	R	Perirenal fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	360	120419-360	B 6-4	R	Kidney	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	361	120419-361	B 6-5	P	Neck Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	362	120419-362	B 6-5	P	Back fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	363	120419-363	B 6-5	P	Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	364	120419-364	B 6-5	P	Liver	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	365	120419-365	B 6-5	P	Perirenal fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	366	120419-366	B 6-5	P	Kidney	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	367	120419-367	B 6-5	R	Neck Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	368	120419-368	B 6-5	R	Back fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	369	120419-369	B 6-5	R	Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	370	120419-370	B 6-5	R	Liver	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	371	120419-371	B 6-5	R	Perirenal fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	372	120419-372	B 6-5	R	Kidney	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	373	120419-373	B 6-6	P	Neck Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	374	120419-374	B 6-6	P	Back fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	375	120419-375	B 6-6	P	Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	376	120419-376	B 6-6	P	Liver	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	377	120419-377	B 6-6	P	Perirenal fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	378	120419-378	B 6-6	P	Kidney	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	379	120419-379	B 6-6	R	Neck Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	380	120419-380	B 6-6	R	Back fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	381	120419-381	B 6-6	R	Muscle	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	382	120419-382	B 6-6	R	Liver	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	383	120419-383	B 6-6	R	Perirenal fat	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	384	120419-384	B 6-6	R	Kidney	56 DAT	BUTALEX	5mL/100kg	Solution	Angus X	11-Oct-12
120419	385	120419-385	Pi 7 - 1	P	Neck Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	386	120419-386	Pi 7 - 1	P	Back fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	387	120419-387	Pi 7 - 1	P	Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	388	120419-388	Pi 7 - 1	P	Liver	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	389	120419-389	Pi 7 - 1	P	Perirenal fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	390	120419-390	Pi 7 - 1	P	Kidney	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	391	120419-391	Pi 7 - 1	R	Neck Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	392	120419-392	Pi 7 - 1	R	Back fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	393	120419-393	Pi 7 - 1	R	Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	394	120419-394	Pi 7 - 1	R	Liver	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	395	120419-395	Pi 7 - 1	R	Perirenal fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	396	120419-396	Pi 7 - 1	R	Kidney	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	397	120419-397	Pi 7-2	P	Neck Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	398	120419-398	Pi 7-2	P	Back fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	399	120419-399	Pi 7-2	P	Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	400	120419-400	Pi 7-2	P	Liver	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	401	120419-401	Pi 7-2	P	Perirenal fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	402	120419-402	Pi 7-2	P	Kidney	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	403	120419-403	Pi 7-2	R	Neck Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	404	120419-404	Pi 7-2	R	Back fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	405	120419-405	Pi 7-2	R	Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	406	120419-406	Pi 7-2	R	Liver	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	407	120419-407	Pi 7-2	R	Perirenal fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	408	120419-408	Pi 7-2	R	Kidney	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	409	120419-409	Pi 7-3	P	Neck Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	410	120419-410	Pi 7-3	P	Back fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	411	120419-411	Pi 7-3	P	Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	412	120419-412	Pi 7-3	P	Liver	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	413	120419-413	Pi 7-3	P	Perirenal fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	414	120419-414	Pi 7-3	P	Kidney	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	415	120419-415	Pi 7-3	R	Neck Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	416	120419-416	Pi 7-3	R	Back fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	417	120419-417	Pi 7-3	R	Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	418	120419-418	Pi 7-3	R	Liver	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	419	120419-419	Pi 7-3	R	Perirenal fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	420	120419-420	Pi 7-3	R	Kidney	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	421	120419-421	Pi 7-4	P	Neck Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	422	120419-422	Pi 7-4	P	Back fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	423	120419-423	Pi 7-4	P	Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	424	120419-424	Pi 7-4	P	Liver	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	425	120419-425	Pi 7-4	P	Perirenal fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	426	120419-426	Pi 7-4	P	Kidney	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	427	120419-427	Pi 7-4	R	Neck Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	428	120419-428	Pi 7-4	R	Back fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	429	120419-429	Pi 7-4	R	Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	430	120419-430	Pi 7-4	R	Liver	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	431	120419-431	Pi 7-4	R	Perirenal fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	432	120419-	Pi 7-4	R	Kidney	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	433	120419-433	Pi 7-5	P	Neck Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	434	120419-434	Pi 7-5	P	Back fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	435	120419-435	Pi 7-5	P	Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	436	120419-436	Pi 7-5	P	Liver	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	437	120419-437	Pi 7-5	P	Perirenal fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	438	120419-438	Pi 7-5	P	Kidney	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	439	120419-439	Pi 7-5	R	Neck Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	440	120419-440	Pi 7-5	R	Back fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	441	120419-441	Pi 7-5	R	Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	442	120419-442	Pi 7-5	R	Liver	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	443	120419-443	Pi 7-5	R	Perirenal fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	444	120419-444	Pi 7-5	R	Kidney	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	445	120419-445	Pi 7-6	P	Neck Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	446	120419-446	Pi 7-6	P	Back fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	447	120419-447	Pi 7-6	P	Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	448	120419-448	Pi 7-6	P	Liver	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	449	120419-449	Pi 7-6	P	Perirenal fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	450	120419-450	Pi 7-6	P	Kidney	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	451	120419-451	Pi 7-6	R	Neck Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	452	120419-452	Pi 7-6	R	Back fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	453	120419-453	Pi 7-6	R	Muscle	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	454	120419-454	Pi 7-6	R	Liver	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	455	120419-455	Pi 7-6	R	Perirenal fat	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	456	120419-456	Pi 7-6	R	Kidney	70 DAT	BUTALEX	5mL/100kg	Solution	Angus X	25-Oct-12
120419	457	120419-457	Pu 8-1	P	Neck Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	458	120419-458	Pu 8-1	P	Back fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	459	120419-459	Pu 8-1	P	Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	460	120419-460	Pu 8-1	P	Liver	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	461	120419-461	Pu 8-1	P	Perirenal fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	462	120419-462	Pu 8-1	P	Kidney	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	463	120419-463	Pu 8-1	R	Neck Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	464	120419-464	Pu 8-1	R	Back fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	465	120419-465	Pu 8-1	R	Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	466	120419-466	Pu 8-1	R	Liver	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	467	120419-467	Pu 8-1	R	Perirenal fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	468	120419-468	Pu 8-1	R	Kidney	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	469	120419-469	Pu 8-2	P	Neck Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	470	120419-470	Pu 8-2	P	Back fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	471	120419-471	Pu 8-2	P	Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	472	120419-472	Pu 8-2	P	Liver	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	473	120419-473	Pu 8-2	P	Perirenal fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	474	120419-474	Pu 8-2	P	Kidney	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	475	120419-475	Pu 8-2	R	Neck Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	476	120419-476	Pu 8-2	R	Back fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	477	120419-477	Pu 8-2	R	Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	478	120419-478	Pu 8-2	R	Liver	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	479	120419-479	Pu 8-2	R	Perirenal fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	480	120419-480	Pu 8-2	R	Kidney	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	481	120419-481	Pu 8-3	P	Neck Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	482	120419-482	Pu 8-3	P	Back fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	483	120419-483	Pu 8-3	P	Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	484	120419-484	Pu 8-3	P	Liver	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	485	120419-485	Pu 8-3	P	Perirenal fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	486	120419-486	Pu 8-3	P	Kidney	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	487	120419-487	Pu 8-3	R	Neck Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	488	120419-488	Pu 8-3	R	Back fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	489	120419-489	Pu 8-3	R	Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	490	120419-490	Pu 8-3	R	Liver	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	491	120419-491	Pu 8-3	R	Perirenal fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	492	120419-492	Pu 8-3	R	Kidney	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	493	120419-493	Pu 8-4	P	Neck Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	494	120419-494	Pu 8-4	P	Back fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	495	120419-495	Pu 8-4	P	Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	496	120419-496	Pu 8-4	P	Liver	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	497	120419-497	Pu 8-4	P	Perirenal fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	498	120419-498	Pu 8-4	P	Kidney	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	499	120419-499	Pu 8-4	R	Neck Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	500	120419-500	Pu 8-4	R	Back fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	501	120419-501	Pu 8-4	R	Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	502	120419-502	Pu 8-4	R	Liver	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	503	120419-503	Pu 8-4	R	Perirenal fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	504	120419-504	Pu 8-4	R	Kidney	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	505	120419-505	Pu 8-5	P	Neck Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	506	120419-506	Pu 8-5	P	Back fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	507	120419-507	Pu 8-5	P	Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	508	120419-508	Pu 8-5	P	Liver	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	509	120419-	Pu 8-5	P	Perirenal fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	509	120419-509	Pu 8-5	P	Kidney	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	510	120419-510	Pu 8-5	R	Neck Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	511	120419-511	Pu 8-5	R	Back fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	512	120419-512	Pu 8-5	R	Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	513	120419-513	Pu 8-5	R	Liver	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	514	120419-514	Pu 8-5	R	Perirenal fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	515	120419-515	Pu 8-5	R	Kidney	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	516	120419-516	Pu 8-6	P	Neck Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	517	120419-517	Pu 8-6	P	Back fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	518	120419-518	Pu 8-6	P	Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	519	120419-519	Pu 8-6	P	Liver	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	520	120419-520	Pu 8-6	P	Perirenal fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	521	120419-521	Pu 8-6	P	Kidney	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	522	120419-522	Pu 8-6	R	Neck Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	523	120419-523	Pu 8-6	R	Back fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	524	120419-524	Pu 8-6	R	Muscle	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	525	120419-525	Pu 8-6	R	Liver	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	526	120419-526	Pu 8-6	R	Perirenal fat	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	527	120419-527	Pu 8-6	R	Kidney	84 DAT	BUTALEX	5mL/100kg	Solution	Angus X	08-Nov-12
120419	528	120419-528	B 12-4	P	Neck Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	529	120419-529	B 12-4	P	Back fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	530	120419-530	B 12-4	P	Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	531	120419-531	B 12-4	P	Liver	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	532	120419-532	B 12-4	P	Perirenal fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	533	120419-533	B 12-4	P	Kidney	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	534	120419-534	B 12-4	R	Neck Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	535	120419-535	B 12-4	R	Back fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	536	120419-536	B 12-4	R	Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	537	120419-537	B 12-4	R	Liver	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	538	120419-538	B 12-4	R	Perirenal fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	539	120419-539	B 12-4	R	Kidney	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	540	120419-540	R 9-2	P	Neck Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	541	120419-541	R 9-2	P	Back fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	542	120419-542	R 9-2	P	Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	543	120419-543	R 9-2	P	Liver	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	544	120419-544	R 9-2	P	Perirenal fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	545	120419-545	R 9-2	P	Kidney	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	546	120419-546	R 9-2	R	Neck Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	547	120419-547	R 9-2	R	Back fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	548	120419-548	R 9-2	R	Back fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	549	120419-549	R 9-2	R	Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	550	120419-550	R 9-2	R	Liver	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	551	120419-551	R 9-2	R	Perirenal fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	552	120419-552	R 9-2	R	Kidney	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	553	120419-553	R 9-3	P	Neck Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	554	120419-554	R 9-3	P	Back fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	555	120419-555	R 9-3	P	Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	556	120419-556	R 9-3	P	Liver	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	557	120419-557	R 9-3	P	Perirenal fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	558	120419-558	R 9-3	P	Kidney	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	559	120419-559	R 9-3	R	Neck Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	560	120419-560	R 9-3	R	Back fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	561	120419-561	R 9-3	R	Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	562	120419-562	R 9-3	R	Liver	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	563	120419-563	R 9-3	R	Perirenal fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	564	120419-564	R 9-3	R	Kidney	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	565	120419-565	R 9-4	P	Neck Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	566	120419-566	R 9-4	P	Back fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	567	120419-567	R 9-4	P	Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	568	120419-568	R 9-4	P	Liver	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	569	120419-569	R 9-4	P	Perirenal fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	570	120419-570	R 9-4	P	Kidney	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	571	120419-571	R 9-4	R	Neck Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	572	120419-572	R 9-4	R	Back fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	573	120419-573	R 9-4	R	Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	574	120419-574	R 9-4	R	Liver	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	575	120419-575	R 9-4	R	Perirenal fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	576	120419-576	R 9-4	R	Kidney	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	577	120419-577	R 9-5	P	Neck Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	578	120419-578	R 9-5	P	Back fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	579	120419-579	R 9-5	P	Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	580	120419-580	R 9-5	P	Liver	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	581	120419-581	R 9-5	P	Perirenal fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	582	120419-582	R 9-5	P	Kidney	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	583	120419-583	R 9-5	R	Neck Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	584	120419-584	R 9-5	R	Back fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	585	120419-585	R 9-5	R	Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	586	120419-	R 9-5	R	Liver	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	587	120419-586	R 9-5	R	Perirenal fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	588	120419-587	R 9-5	R	Kidney	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	589	120419-588	R 9-6	P	Neck Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	590	120419-589	R 9-6	P	Back fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	591	120419-590	R 9-6	P	Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	592	120419-591	R 9-6	P	Liver	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	593	120419-592	R 9-6	P	Perirenal fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	594	120419-593	R 9-6	P	Kidney	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	595	120419-594	R 9-6	R	Neck Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	596	120419-595	R 9-6	R	Back fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	597	120419-596	R 9-6	R	Muscle	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	598	120419-597	R 9-6	R	Liver	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	599	120419-598	R 9-6	R	Perirenal fat	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	600	120419-599	R 9-6	R	Kidney	98 DAT	BUTALEX	5mL/100kg	Solution	Angus X	22-Nov-12
120419	601	120419-600	Y 10 -1	P	Neck Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	602	120419-601	Y 10 -1	P	Back fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	603	120419-602	Y 10 -1	P	Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	604	120419-603	Y 10 -1	P	Liver	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	605	120419-604	Y 10 -1	P	Perirenal fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	606	120419-605	Y 10 -1	P	Kidney	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	607	120419-606	Y 10 -1	R	Neck Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	608	120419-607	Y 10 -1	R	Back fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	609	120419-608	Y 10 -1	R	Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	610	120419-609	Y 10 -1	R	Liver	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	611	120419-610	Y 10 -1	R	Perirenal fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	612	120419-611	Y 10 -1	R	Kidney	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	613	120419-612	Y 10-2	P	Neck Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	614	120419-613	Y 10-2	P	Back fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	615	120419-614	Y 10-2	P	Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	616	120419-615	Y 10-2	P	Liver	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	617	120419-616	Y 10-2	P	Perirenal fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	618	120419-617	Y 10-2	P	Kidney	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	619	120419-618	Y 10-2	R	Neck Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	620	120419-619	Y 10-2	R	Back fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	621	120419-620	Y 10-2	R	Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	622	120419-621	Y 10-2	R	Liver	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	623	120419-622	Y 10-2	R	Perirenal fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	624	120419-623	Y 10-2	R	Kidney	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
		120419-624									

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	625	120419-625	Y 10 -3	P	Neck Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	626	120419-626	Y 10 -3	P	Back fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	627	120419-627	Y 10 -3	P	Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	628	120419-628	Y 10 -3	P	Liver	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	629	120419-629	Y 10 -3	P	Perirenal fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	630	120419-630	Y 10 -3	P	Kidney	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	631	120419-631	Y 10 -3	R	Neck Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	632	120419-632	Y 10 -3	R	Back fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	633	120419-633	Y 10 -3	R	Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	634	120419-634	Y 10 -3	R	Liver	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	635	120419-635	Y 10 -3	R	Perirenal fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	636	120419-636	Y 10 -3	R	Kidney	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	637	120419-637	Y 10-4	P	Neck Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	638	120419-638	Y 10-4	P	Back fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	639	120419-639	Y 10-4	P	Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	640	120419-640	Y 10-4	P	Liver	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	641	120419-641	Y 10-4	P	Perirenal fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	642	120419-642	Y 10-4	P	Kidney	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	643	120419-643	Y 10-4	R	Neck Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	644	120419-644	Y 10-4	R	Back fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	645	120419-645	Y 10-4	R	Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	646	120419-646	Y 10-4	R	Liver	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	647	120419-647	Y 10-4	R	Perirenal fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	648	120419-648	Y 10-4	R	Kidney	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	649	120419-649	Y 10-5	P	Neck Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	650	120419-650	Y 10-5	P	Back fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	651	120419-651	Y 10-5	P	Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	652	120419-652	Y 10-5	P	Liver	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	653	120419-653	Y 10-5	P	Perirenal fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	654	120419-654	Y 10-5	P	Kidney	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	655	120419-655	Y 10-5	R	Neck Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	656	120419-656	Y 10-5	R	Back fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	657	120419-657	Y 10-5	R	Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	658	120419-658	Y 10-5	R	Liver	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	659	120419-659	Y 10-5	R	Perirenal fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	660	120419-660	Y 10-5	R	Kidney	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	661	120419-661	Y 10 -6	P	Neck Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	662	120419-662	Y 10 -6	P	Back fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	663	120419-	Y 10 -6	P	Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	663	120419-663	Y 10 -6	P	Liver	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	664	120419-664	Y 10 -6	P	Perirenal fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	665	120419-665	Y 10 -6	P	Kidney	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	666	120419-666	Y 10 -6	R	Neck Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	667	120419-667	Y 10 -6	R	Back fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	668	120419-668	Y 10 -6	R	Muscle	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	669	120419-669	Y 10 -6	R	Liver	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	670	120419-670	Y 10 -6	R	Perirenal fat	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	671	120419-671	Y 10 -6	R	Kidney	119 DAT	BUTALEX	5mL/100kg	Solution	Angus X	13-Dec-12
120419	672	120419-672	G 11-1	P	Neck Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	673	120419-673	G 11-1	P	Back fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	674	120419-674	G 11-1	P	Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	675	120419-675	G 11-1	P	Liver	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	676	120419-676	G 11-1	P	Perirenal fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	677	120419-677	G 11-1	P	Kidney	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	678	120419-678	G 11-1	R	Neck Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	679	120419-679	G 11-1	R	Back fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	680	120419-680	G 11-1	R	Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	681	120419-681	G 11-1	R	Liver	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	682	120419-682	G 11-1	R	Perirenal fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	683	120419-683	G 11-1	R	Kidney	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	684	120419-684	G 11-2	P	Neck Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	685	120419-685	G 11-2	P	Back fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	686	120419-686	G 11-2	P	Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	687	120419-687	G 11-2	P	Liver	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	688	120419-688	G 11-2	P	Perirenal fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	689	120419-689	G 11-2	P	Kidney	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	690	120419-690	G 11-2	R	Neck Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	691	120419-691	G 11-2	R	Back fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	692	120419-692	G 11-2	R	Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	693	120419-693	G 11-2	R	Liver	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	694	120419-694	G 11-2	R	Perirenal fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	695	120419-695	G 11-2	R	Kidney	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	696	120419-696	G 5-1	P	Neck Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	697	120419-697	G 5-1	P	Back fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	698	120419-698	G 5-1	P	Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	699	120419-699	G 5-1	P	Liver	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	700	120419-700	G 5-1	P	Perirenal fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	701	120419-701	G 5-1	P	Kidney	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	702	120419-702	G 5-1	P	Kidney	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	703	120419-703	G 5-1	R	Neck Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	704	120419-704	G 5-1	R	Back fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	705	120419-705	G 5-1	R	Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	706	120419-706	G 5-1	R	Liver	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	707	120419-707	G 5-1	R	Perirenal fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	708	120419-708	G 5-1	R	Kidney	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	709	120419-709	G 11-4	P	Neck Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	710	120419-710	G 11-4	P	Back fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	711	120419-711	G 11-4	P	Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	712	120419-712	G 11-4	P	Liver	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	713	120419-713	G 11-4	P	Perirenal fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	714	120419-714	G 11-4	P	Kidney	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	715	120419-715	G 11-4	R	Neck Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	716	120419-716	G 11-4	R	Back fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	717	120419-717	G 11-4	R	Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	718	120419-718	G 11-4	R	Liver	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	719	120419-719	G 11-4	R	Perirenal fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	720	120419-720	G 11-4	R	Kidney	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	721	120419-721	G 11-5	P	Neck Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	722	120419-722	G 11-5	P	Back fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	723	120419-723	G 11-5	P	Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	724	120419-724	G 11-5	P	Liver	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	725	120419-725	G 11-5	P	Perirenal fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	726	120419-726	G 11-5	P	Kidney	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	727	120419-727	G 11-5	R	Neck Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	728	120419-728	G 11-5	R	Back fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	729	120419-729	G 11-5	R	Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	730	120419-730	G 11-5	R	Liver	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	731	120419-731	G 11-5	R	Perirenal fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	732	120419-732	G 11-5	R	Kidney	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	733	120419-733	G 11-6	P	Neck Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	734	120419-734	G 11-6	P	Back fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	735	120419-735	G 11-6	P	Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	736	120419-736	G 11-6	P	Liver	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	737	120419-737	G 11-6	P	Perirenal fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	738	120419-738	G 11-6	P	Kidney	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	739	120419-739	G 11-6	R	Neck Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	740	120419-	G 11-6	R	Back fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	741	120419-740	G 11-6	R	Muscle	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	742	120419-741	G 11-6	R	Liver	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	743	120419-742	G 11-6	R	Perirenal fat	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	744	120419-743	G 11-6	R	Kidney	147 DAT	BUTALEX	5mL/100kg	Solution	Angus X	10-Jan-13
120419	745	120419-744	B 12-1	P	Neck Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	746	120419-745	B 12-1	P	Back fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	747	120419-746	B 12-1	P	Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	748	120419-747	B 12-1	P	Liver	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	749	120419-748	B 12-1	P	Perirenal fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	750	120419-749	B 12-1	P	Kidney	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	751	120419-750	B 12-1	R	Neck Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	752	120419-751	B 12-1	R	Back fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	753	120419-752	B 12-1	R	Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	754	120419-753	B 12-1	R	Liver	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	755	120419-754	B 12-1	R	Perirenal fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	756	120419-755	B 12-1	R	Kidney	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	757	120419-756	B 12-2	P	Neck Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	758	120419-757	B 12-2	P	Back fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	759	120419-758	B 12-2	P	Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	760	120419-759	B 12-2	P	Liver	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	761	120419-760	B 12-2	P	Perirenal fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	762	120419-761	B 12-2	P	Kidney	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	763	120419-762	B 12-2	R	Neck Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	764	120419-763	B 12-2	R	Back fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	765	120419-764	B 12-2	R	Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	766	120419-765	B 12-2	R	Liver	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	767	120419-766	B 12-2	R	Perirenal fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	768	120419-767	B 12-2	R	Kidney	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	769	120419-768	B 12-3	P	Neck Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	770	120419-769	B 12-3	P	Back fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	771	120419-770	B 12-3	P	Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	772	120419-771	B 12-3	P	Liver	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	773	120419-772	B 12-3	P	Perirenal fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	774	120419-773	B 12-3	P	Kidney	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	775	120419-774	B 12-3	R	Neck Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	776	120419-775	B 12-3	R	Back fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	777	120419-776	B 12-3	R	Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	778	120419-777	B 12-3	R	Liver	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
		120419-778									

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	779	120419-779	B 12-3	R	Perirenal fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	780	120419-780	B 12-3	R	Kidney	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	781	120419-781	R 9-1	P	Neck Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	782	120419-782	R 9-1	P	Back fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	783	120419-783	R 9-1	P	Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	784	120419-784	R 9-1	P	Liver	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	785	120419-785	R 9-1	P	Perirenal fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	786	120419-786	R 9-1	P	Kidney	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	787	120419-787	R 9-1	R	Neck Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	788	120419-788	R 9-1	R	Back fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	789	120419-789	R 9-1	R	Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	790	120419-790	R 9-1	R	Liver	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	791	120419-791	R 9-1	R	Perirenal fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	792	120419-792	R 9-1	R	Kidney	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	793	120419-793	B 12-5	P	Neck Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	794	120419-794	B 12-5	P	Back fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	795	120419-795	B 12-5	P	Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	796	120419-796	B 12-5	P	Liver	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	797	120419-797	B 12-5	P	Perirenal fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	798	120419-798	B 12-5	P	Kidney	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	799	120419-799	B 12-5	R	Neck Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	800	120419-800	B 12-5	R	Back fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	801	120419-801	B 12-5	R	Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	802	120419-802	B 12-5	R	Liver	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	803	120419-803	B 12-5	R	Perirenal fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	804	120419-804	B 12-5	R	Kidney	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	805	120419-805	B 12-6	P	Neck Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	806	120419-806	B 12-6	P	Back fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	807	120419-807	B 12-6	P	Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	808	120419-808	B 12-6	P	Liver	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	809	120419-809	B 12-6	P	Perirenal fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	810	120419-810	B 12-6	P	Kidney	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	811	120419-811	B 12-6	R	Neck Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	812	120419-812	B 12-6	R	Back fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	813	120419-813	B 12-6	R	Muscle	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	814	120419-814	B 12-6	R	Liver	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	815	120419-815	B 12-6	R	Perirenal fat	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	816	120419-816	B 12-6	R	Kidney	175 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Feb-12
120419	817	120419-	Pi 13-1	P	Neck Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	817	120419-817	Pi 13-1	P	Back fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	818	120419-818	Pi 13-1	P	Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	819	120419-819	Pi 13-1	P	Liver	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	820	120419-820	Pi 13-1	P	Perirenal fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	821	120419-821	Pi 13-1	P	Kidney	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	822	120419-822	Pi 13-1	R	Neck Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	823	120419-823	Pi 13-1	R	Back fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	824	120419-824	Pi 13-1	R	Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	825	120419-825	Pi 13-1	R	Liver	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	826	120419-826	Pi 13-1	R	Perirenal fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	827	120419-827	Pi 13-1	R	Kidney	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	828	120419-828	Pi 13-2	P	Neck Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	829	120419-829	Pi 13-2	P	Back fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	830	120419-830	Pi 13-2	P	Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	831	120419-831	Pi 13-2	P	Liver	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	832	120419-832	Pi 13-2	P	Perirenal fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	833	120419-833	Pi 13-2	P	Kidney	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	834	120419-834	Pi 13-2	R	Neck Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	835	120419-835	Pi 13-2	R	Back fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	836	120419-836	Pi 13-2	R	Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	837	120419-837	Pi 13-2	R	Liver	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	838	120419-838	Pi 13-2	R	Perirenal fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	839	120419-839	Pi 13-2	R	Kidney	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	840	120419-840	Pi 13-3	P	Neck Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	841	120419-841	Pi 13-3	P	Back fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	842	120419-842	Pi 13-3	P	Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	843	120419-843	Pi 13-3	P	Liver	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	844	120419-844	Pi 13-3	P	Perirenal fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	845	120419-845	Pi 13-3	P	Kidney	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	846	120419-846	Pi 13-3	R	Neck Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	847	120419-847	Pi 13-3	R	Back fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	848	120419-848	Pi 13-3	R	Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	849	120419-849	Pi 13-3	R	Liver	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	850	120419-850	Pi 13-3	R	Perirenal fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	851	120419-851	Pi 13-3	R	Kidney	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	852	120419-852	Pi 13-4	P	Neck Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	853	120419-853	Pi 13-4	P	Back fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	854	120419-854	Pi 13-4	P	Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	855	120419-855	Pi 13-4	P	Liver	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13

Trial	Sample	Sample Number	Eartag	Rep	Substrate	Sampling Interval	Product	Rate	Form	Breed	Collection Date
120419	856	120419-856	Pi 13-4	P	Liver	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	857	120419-857	Pi 13-4	P	Perirenal fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	858	120419-858	Pi 13-4	P	Kidney	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	859	120419-859	Pi 13-4	R	Neck Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	860	120419-860	Pi 13-4	R	Back fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	861	120419-861	Pi 13-4	R	Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	862	120419-862	Pi 13-4	R	Liver	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	863	120419-863	Pi 13-4	R	Perirenal fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	864	120419-864	Pi 13-4	R	Kidney	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	865	120419-865	Pi 13-5	P	Neck Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	866	120419-866	Pi 13-5	P	Back fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	867	120419-867	Pi 13-5	P	Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	868	120419-868	Pi 13-5	P	Liver	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	869	120419-869	Pi 13-5	P	Perirenal fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	870	120419-870	Pi 13-5	P	Kidney	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	871	120419-871	Pi 13-5	R	Neck Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	872	120419-872	Pi 13-5	R	Back fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	873	120419-873	Pi 13-5	R	Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	874	120419-874	Pi 13-5	R	Liver	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	875	120419-875	Pi 13-5	R	Perirenal fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	876	120419-876	Pi 13-5	R	Kidney	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	877	120419-877	Pi 13-6	P	Neck Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	878	120419-878	Pi 13-6	P	Back fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	879	120419-879	Pi 13-6	P	Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	880	120419-880	Pi 13-6	P	Liver	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	881	120419-881	Pi 13-6	P	Perirenal fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	882	120419-882	Pi 13-6	P	Kidney	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	883	120419-883	Pi 13-6	R	Neck Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	884	120419-884	Pi 13-6	R	Back fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	885	120419-885	Pi 13-6	R	Muscle	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	886	120419-886	Pi 13-6	R	Liver	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	887	120419-887	Pi 13-6	R	Perirenal fat	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13
120419	888	120419-888	Pi 13-6	R	Kidney	203 DAT	BUTALEX	5mL/100kg	Solution	Angus X	07-Mar-13

21.2 Study plan

Agrisearch

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CONFIDENTIAL

GLP RESIDUE STUDY PLAN

Study Number:	DPINSW/GLP/11/01
Study Title:	A GLP tissue residue study using intramuscular injection of Butalex containing 50 mg/mL Buparvaquone applied to beef cattle.
Sponsor:	Department of Primary Industries NSW 1447 Forest Road Orange NSW 2800
Animal Ethics Approval No.:	1212
APVMA Study Permit No.:	7250
Registration/Licence No:	2692
Study Plan Status:	Final
Study Director:	27 Apr 2012 (Sign and Date) Veronica Smith
Sponsor Rep.:	27/4/12 (Sign and Date) Graham Bailey

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Agricultural and Biological Research Services

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1. Study Plan Circulation

Veronica Smith (Study Director, Agrisearch Services Pty Ltd)

Graham Bailey (Sponsor Representative, Department of Primary Industries NSW)

Martin Collett (Test Facility Manager, Agrisearch Services Pty Ltd)

Ian McRae (Principal Investigator, Agrisearch Services Pty Ltd, Application and Sampling Phase)

Amy Drewett (Principal Investigator, Agrisearch Analytical Pty Ltd, Analytical Phase)

John Eames (Lead Quality Assurance Officer, Agrisearch Services Pty Ltd)

2. Nature and Purpose of the Study

The objective of this study is to determine the buparvaquone tissue residue profile following intramuscular administration of BUTALEX at the maximum label rate to beef cattle.

The study will be conducted in accordance with the following guidelines:

1. APVMA Residue Guideline No. 23 – Data Requirements for Animal Tissue Residue Trials.
2. APVMA Residue Guideline No. 16 – Injectable Veterinary Products.
3. APVMA Residue Guideline No. 26 - Veterinary Drug Residue Analytical Methods.
4. APVMA Residue Guideline No. 8 – Chemicals and Products.
5. APVMA Residue Guideline No. 11 - Reporting of Residue Trials.
6. EMEA CVMP Guideline on Injection Site Residues 13 April 2005

The study will be conducted in compliance with the OECD Principles of Good Laboratory Practice (as revised in 1997).

3. Identification of Test and Reference Items

3.1 Test Item

Product Name	Butalex
Active Constituents and Concentration	50 mg/mL buparvaquone
Formulation Type	Solution
Dose Volume	2.5 mg buparvaquone per kg

The BUTALEX will be supplied ready to use and be administered as a intramuscular injection into the neck muscle at a dose rate of 5 mL/100 kg bodyweight twice in 48 Hours (once on Day -2 and Day 0). Individual animals will be weighed and dosed to their individual bodyweight. The volume (mL) administered will be equal to the individual animals bodyweight (kg) divided by 100 and multiplied by 5. Doses will be rounded up to the next 0.2 mL increment when rounding is required. Administration will be via calibrated 5 mL, 10 mL or 20 mL syringes graduated in 0.2 mL increments and fitted with 1.5 inch 18 gauge needles.

The Test Item will be received, handled, stored, labelled and disposed of as described in SOP AD018 unless otherwise advised in sections of this Study Plan. Unused Test Item and empty Test Item containers will be returned to the Sponsor for disposal.

3.2 Reference Item

There will be no Reference Item used in the Application and Sampling phase of the study.

Reference Items for buparvaquone will be supplied by the Analytical Test Site. The Analytical Test Site will record the expiry date and quantity used in the study, on appropriate forms. Actual storage conditions will be recorded.

3.3 Negative Controls

There will be two untreated animals. Primary and reserve tissue samples will be collected from the negative control animals before sampling of the cattle treated with the Test Item.

3.4 Withholding Period and Permit

The study detailed in this Study Plan will be carried out under APVMA Permit Number 7250. The withholding period specified in this Permit requires that animals do not enter the human food chain for 12 months.

4. Sponsor Representative

Dr Graham Bailey
Department of Primary Industries NSW
1447 Forest Road
Orange NSW 2800
Phone: 02 6391 3455
Fax: 02 6391 3551
graham.bailey@dpi.nsw.gov.au

5. Study Personnel

Managing Test Facility:	Martin Collett Agrisearch Services Pty Ltd 50 Leewood Drive Orange NSW 2800
Study Director:	Veronica Smith Agrisearch Services Pty Ltd 50 Leewood Drive Orange NSW 2800
Principal Investigator: [Application and Sampling phase]	Ian McRae Agrisearch Services Pty Ltd 50 Leewood Drive Orange NSW 2800
Principal Investigator: [Analytical phase]	Amy Drewett Agrisearch Analytical Pty Ltd Level 1, 48 Victoria Road Rozelle NSW 2039
Lead Quality Assurance:	John Eames Agrisearch Services Pty Ltd 20 Lockhart Avenue Castle Hill NSW 2154

6. Study Dates

Proposed Initiation Date	March 2012
Proposed Field Phase Start Date	May 2012
Proposed Field Phase Finish Date	December 2012
Proposed Analytical Phase Start Date	July 2012
Proposed Analytical Phase Finish Date	January 2013
Proposed Completion Date	February 2013

7. Justification of the Test System

Bovine anaemia caused by *Theileria orientalis* is a tick borne disease and occurs throughout the world. The parasite is widespread throughout Australia. However, despite the widespread distribution, losses were most unusual even though parasitaemias of up to 20% and occasionally higher were seen. Since 2006, this situation has appeared to change. NSW DPI Veterinary Laboratories have received an increasing number of submissions where benign theileriosis was diagnosed and Izzo et al (2010) reported on 8 cases of *Theileria* parasitaemias associated with marked anaemia. The Theileriosis Workshop in 2009 resulted in the formation of a Theileria Working Group (TWG). The TWG has examined the research priorities that would lead to a better understanding of the disease and provide farmers with products etc that would either prevent disease or improve treatment outcomes when disease occurred. Chemotherapeutics registered for use in Australia that have been reported to be effective against *Theileria* have been used with mixed results.

Based on literature searches, buparvaquone (BPQ) is expected to be a highly effective chemotherapeutic which is supported by efficacy studies conducted by Queensland DPI with support from MLA B.AHE.0048. Currently BPQ is not registered for use in Australia. The TWG has actively promoted full registration of bupavaquone. However, both private companies have indicated that the projected size of the market does not warrant the costs associated with registration. It has been suggested by the companies that it would be possible for a veterinarian to apply to the Australia Pesticides and Veterinary medicines Authority (APVMA) for consent to import unregistered veterinary chemical products. If a permit was granted, the veterinarian would accept responsibility for residue violations. As the major overseas markets have not established a Maximum Residue Level (MRL), detection of any BPQ or metabolites would be regarded as a violation and have serious ramifications for the veterinarian and for Australian cattle industry. Withholding periods have been provided by manufacturers on BPQ sold in overseas markets based on methodologies available in the late 1970s. Technological advances can be expected to have lowered detection limits since then. In an attempt to reduce the potential for violations, APVMA has suggested that residue data be generated that provides data establishing the time required for BPQ levels following administration to fall below the Limit of Detection (LOD). This is strongly supported by the TWG. It is proposed this be done as a 2 step process as follows:

1. Develop and validate a method of analysis for the determination of residues of buparvaquone in animal tissues & milk. This study was funded by MLA as B. AHE. 0078.
2a. Perform tissue residue study to support a withholding period for meat.
2b. Perform tissue residue study to support a withholding period for milk.

This Test system is Part 2a.

8. Details of the Test System

8.1 Study Animals (Test System)

Species	*Bos Taurus*
Breed	Beef breeds such as Hereford, Angus, Murray Grey, Charolais, Short Horn or crosses not Dairy breeds
Number	74
Sex	Steers or Mixed (50% of each)
Initial Age	9 – 18 months
Bodyweight Range	200 – 300 kg (± 20 kg at the beginning of the study)
Condition	Animals will be in store condition, but be in good enough condition to enable collection of fat samples

The Animal Suppliers Declaration will state the source of the animals if the animals are not sourced from the Test Site. The Animal Suppliers Declaration will also state that the animals sourced for the study have not been treated with any product containing active ingredients of similar chemistry to the Test Item for at least 6 months prior to commencement of the study. Animals that are obviously sick, overly lean or fat will be excluded from the study. The source of the animals will be recorded and described in the raw data and the study report.

8.2 Animal Management and Housing

The animals will be managed according to accepted standard good agricultural practice. They will be maintained outdoors on pasture and have free access to fresh drinking water at all times and adequate shade will be provided. Their daily routine, diet and accommodation will be recorded and described in the study report. The paddocks that the animals will be maintained in following treatment will be identified and mapped on a farm and local area basis.

The cattle treated with the Test Item will be run in up to three large sheltered paddocks and the untreated animals will be kept separate to the treated cattle at all times in a sheltered paddock. If animals are brought onto the farm from elsewhere, they will be acclimatised for two weeks before treatment.

8.3 Animal Weighing

Cattle will be weighed according to Agrisearch SOP EQ005.

8.4 Animal Welfare

The Study Plan will be submitted to the Agrisearch Services Pty Ltd Animal Care and Ethics Committee for review. The study will comply with the NSW animal welfare legislation and the current guidelines on animal research of the National Health & Medical Research Council. A copy of the ACEC approval will be supplied to the Sponsor prior to the start of the trial.

Any animal that the PI or SD considers is exhibiting excessive levels of pain, discomfort or stress will be removed from the study and given immediate, remedial attention. Where possible the Sponsor will be consulted before an animal is withdrawn from the study.

Animals will be observed on the day of treatment, the day after treatment, at least 3 times per week and at each sampling interval by experienced animal attendants. Any animal that appears unwell will be reported to the Principal Investigator who will in turn notify the Study Director and the Sponsor. If required a detailed clinical examination will be performed by a veterinarian and the results recorded.

Depending on the findings and at the attending veterinarian's discretion the animal may be left untreated (if no treatment is indicated), treated (the treatments recorded) and the animal retained in the study or the animal may be withdrawn from the study. Withdrawal from the study is justified if in the attending veterinarian's opinion the animal is unlikely to survive the duration of the study and/or is unduly suffering and/or is affected by a condition for which successful treatment is unlikely. Where possible the Sponsor will be consulted before an animal is withdrawn from a study.

Any animals that die during the study will be subject to post-mortem and a report will be included in the final report. The Sponsor will be notified as soon as possible if any animal dies during the study.

The cattle involved in the study will be subjected to the following procedures that may impact on their health and well-being as a result of inclusion in this study:

- Installation of one new ear tag in each ear using a commercially available applicator.
- Application of the injectable formulation according to good agricultural practice using commercially available equipment.
- Cattle will be humanely slaughtered and tissues collected according to Agrisearch Services Pty Ltd SOP AH005.

8.5 Adverse Events

An adverse event is an unanticipated experience, reaction, side effect, or death associated with the use of a product. Adverse events also include any unreasonable risk/adverse effects to man or the environment following the use of the product. When an adverse event is reported, the Adverse Events Report is to be completed reported to the Sponsor Representative as soon as possible after the event.

8.6 Animal Disposal

All animals will be slaughtered unless if at two consecutive sample times residue levels are below the LOD and the study is concluded early. Slaughtered animals must not be used for human consumption. The spare animals can be returned to commercial production following the specified 12 month withholding periods.

9. Details of the Test Facility and Test Sites

Test Facility Location:
Agrisearch Services Pty Ltd
50 Leewood Drive
Orange, NSW, 2800, AUSTRALIA
Telephone: +61 2 6362 4539
Facsimile: +61 2 6362 7844
E-mail: martin.collett@agrisearch.com.au

Test Site Analytical:
Agrisearch Analytical Pty Ltd
Level 1, 48 Victoria Road
Rozelle, NSW, 2039
Telephone: +61 2 9810 3666
Facsimile: +61 2 9810 3866
E-mail: susan_mckeon@agrisearchanalytical.com.au

The study will be managed from the Agrisearch Services Pty Ltd Test Facility located at 50 Leewood Drive, Orange, NSW, 2800, Australia.

The animals will be located at a commercial farm near the Test Site where all animal husbandry procedures including treatment with the Test Item and euthanasia for the purpose of tissue collection will take place. The farm will have suitable paddocks including adequate pasture, shelter and water. Animals will be held outdoors before and after treatment in accordance with normal agricultural practice.

Tissue sample analysis will be conducted at the Test Site, Analytical. Specimens (Primary Samples) when hard frozen will be sent by freezer truck from the Test Facility to the Test Site Analytical to arrive before the end of the working day where possible.

10. Study Experimental Design

10.1 Treatment Details

This is a tissue residue study with seventy two (72) treated cattle and two (2) untreated control cattle in store condition.

The Test Item will be provided by the Study Sponsor. It is a ready to use formulation and hence requires no dilution or preparation prior to use apart from 10 inversions to ensure homogeneity.

The specific treatment details are as follows:

Table 1 Treatment Groups

Treatment Group	Concentration	Dose Volume (mL/100kg body weight)	Number of Cattle
1. Untreated Control	Nil	Nil	2
2. BUTALEX	50 mg/ml buparvaquone	5.0	72

The untreated control animals (Group 1) will remain physically separated from the treated cattle (Group 2) immediately following allocation to treatment groups until after tissue collection.

10.2 Animal Allocation and Identification

On Day -7, the cattle will be weighed and ranked by live mass within gender. Individual animals will be identified with two unique coloured and numbered ear tags, one tag in each ear. All cattle will have the same coloured but differently numbered ear tag in one ear and following allocation a differently coloured ear tag will be placed into the other ear for each tissue sampling group.

All of the animals within each gender will be weighed and ranked from highest to lowest weight. The animal ranked 18 within gender will form the untreated group.

The remaining animals in each gender group will be blocked into 3 blocks of 12 animals from highest to lowest weight and one animal from within each block will be randomly allocated (randomisation method to be recorded) to the 12 tissue sampling groups to be treated with the Test Item to give 12 groups of cattle per gender group with a similar mean bodyweight.

10.3 Treatment Method and Details

The untreated animals will not be treated and will be removed from the site of treatment before application commences.

Each of the animals in Treatment Group 2 will be restrained in a head crush and have the Test Item administered intramuscularly into the upper neck muscle. Injection sites will be shaved and then swabbed or sprayed with ethanol (or methylated spirits) immediately prior to treatment. Care shall be taken to avoid (or remove via scrubbing and swabbing) any dirt or faecal material from the proposed injection site.

The Test Item will be administered at a dose rate of 5 mL/100 kg bodyweight on Day -2 and Day 0. Individual animals will be weighed and dosed to their individual body weight. The volume (mL) to be administered will be equal to the individual animals bodyweight (kg) divided by 100 and multiplied by 5. Doses will be rounded up to the next 0.2 mL increment when rounding is required but will not exceed 10 mL per injection. If the dose required is greater than 10 mL (animals greater than 200 kg) more than one injection will be administered. One injection should then be placed on both sides of the neck. Administration will be via calibrated (SOP EQ008) 5 mL or 10 mL syringes graduated in 0.2 mL increments and fitted with 1.5 inch 21, 19 or 18 gauge needles.

Individual animal weights, calculated and administered doses and the time of treatment are to be recorded for each animal. The details of the syringes used will be recorded. This method will be used as the formulation has been developed for intramuscular administration.

To minimise exposure to the active constituents during application, safety precautions will be taken. Personnel will be advised to avoid skin and eye contact. Long sleeved shirts and chemical resistant gloves should be worn. Further information can be obtained from Section 8 - Exposure Controls and Personal Protection of the Material Safety Data Sheet. The Investigator will be responsible for the health and welfare of the personnel involved in the study.

10.4 Treatment Timing

A single application of the Test Item will be made to individual animals in treatment Group 2 on Day -2 and again on Day 0. The time of treatment will be recorded along with climatic conditions during the treatment period.

10.5 Safety

The animals will be inspected twice in the 24 hours after each application of the Test Item and 3 times a week thereafter. The injection site will be visually inspected for signs of injection site reactions at each sampling time, the injection site must not be physically handled due to the possibility of cross contamination of the tissue samples. The Study Personnel will document any findings. In case of an Adverse Event the PI and SD will be notified immediately or as soon as possible and appropriate medical attention, if necessary, will be supplied to the affected animals.

10.6 Concomitant Treatments

Any treatments or medications administered to any of the study animals during the course of the study will be subject to approval in advance by the Sponsor. Any treatment will be recorded and reasons for administration documented.

10.7 Sampling Methods and Details

Tissue Residue

Tissue sampling will be conducted according to the schedule presented below:

Sampling Treatment Group	Number of Animals	Interval Between Treatment of Group 2 and Sampling (Days)
1. Untreated	2	6
2.1 BUTALEX	6	7
2.2 BUTALEX	6	14
2.3 BUTALEX	6	28
2.4 BUTALEX	6	42
2.5 BUTALEX	6	56
2.6 BUTALEX	6	70
2.7 BUTALEX	6	84
2.8 BUTALEX	6	98
2.9 BUTALEX	6	119
2.10 BUTALEX	6	147
2.11 BUTALEX	6	175
2.12 BUTALEX	6	203

Tissue samples (min. 100 g) will be collected according to Agrisearch Services SOP AH005 and EMEA CVMP Guideline on Injection Site Residues 13 April 2005

The collection of neck muscle samples in this study is to address the issue of injection site residues. As the neck muscle samples are being collected to address the issue of injection site residues EMEA CVMP Guideline on Injection Site Residues 13 April 2005 should be followed where relevant.

At slaughter, particular care will be taken not to transfer any contamination from the skin surface to the tissues inside the carcase. As residual treatment may remain around the site of injection. Different operators will perform the tasks of stunning/bleeding/flaying, evisceration and sample collection.

Tissues will be collected from six sites on every animal: neck muscle, subcutaneous back fat (within 100 mm of the dorsal midline; if there is insufficient fat for sampling on the back, the subcutaneous fat sample can be supplemented from the brisket for the reserve sample and this noted in the sample collection records), skeletal muscle (tender loin region), liver, peri-renal fat and kidney. Samples will be chilled following collection and placed in the Test Facility GLP freezer within 12 hours of collection.

The untreated control animals will be processed first at the initial sampling time of 6 days post-treatment to avoid cross contamination from treated animals.

10.8 Sample Storage, Handling and Shipping

Storage and Handling

Samples will be handled and stored according to Agrisearch Services SOP AD018.

The reserve samples will be stored at the Test Facility GLP freezer according to Agrisearch Services SOP AD018 until the primary samples have been analysed and approval for disposal has been given by the Sponsor.

Shipping

Samples will be shipped according to Agrisearch Services SOP AD019.

The primary tissue samples for the Test Item treatment group will be sent to the analytical laboratory on six occasions after sample collections and when the samples are all frozen solid. Both the primary and the reserve tissue samples for the untreated control group animal will be sent to the analytical laboratory.

11. Study Schedule

Day	Activity
Day -21 to -16	Source suitable cattle
Day -16 to -2	Acclimatise cattle
Day -7	Weigh and allocate cattle.
Day -2	Treat all cattle – leave two untreated
Day 0	Treat all cattle – leave two untreated
Day 6	Residue samples collected from 2 untreated cattle
Day 7	Residue samples collected from 6 cattle
Day 14	Residue samples collected from 6 cattle
Day 28	Residue samples collected from 6 cattle
Day 42	Residue samples collected from 6 cattle
Day 56	Residue samples collected from 6 cattle
Day 58	Send samples to Agrisearch Analytical Pty Ltd for analysis.
Day 70	Residue samples collected from 6 cattle
Day 84	Residue samples collected from 6 cattle
Day 98	Residue samples collected from 6 cattle
Day 100	Send samples to Agrisearch Analytical Pty Ltd for analysis.
Day 119	Residue samples collected from 6 cattle and send samples to Agrisearch Analytical Pty Ltd for analysis.
Day 147	Residue samples collected from 6 cattle and send samples to Agrisearch Analytical Pty Ltd for analysis.
Day 175	Residue samples collected from 6 cattle and send samples to Agrisearch Analytical Pty Ltd for analysis.
Day 203	Residue samples collected from 6 cattle and send samples to Agrisearch Analytical Pty Ltd for analysis.
Within 30 days of receipt of analytical data	Send GLP tissue residue report

12. Analytical Details and Procedures

12.1 Analytical Criteria

Pesticide	Substrate	Limit of Quantification (LOQ) mg/kg	Moisture Analysis Required	Basis on which Results are to be Reported
Buparvaquone	Bovine tissues	0.01	No	As received

12.2 Reference Item

A portion of the certified reference item buparvaquone will be supplied by the manufacturer of the test item or will be purchased commercially. This is the reference item to be used in the study. The Principal Investigator (analytical phase) will ensure that the details of the reference item, such as purity, identification number, storage conditions and recertification are recorded and included in the analytical report.

12.3 Residue Definition

The residue definition was not set in the APVMA MRL Standard. Only parent compound buparvaquone will be analysed.

12.4 Method of Analysis

" Determination of Buparvaquone Residues in Bovine Tissues and Milk by HPLC/MS/MS", AATM-R-170, Agrisearch Analytical Pty Ltd

Changes to the equipment, reagents and chromatographic conditions described in the analytical test method may be necessary due to the availability of equipment and reagents available to the analytical test site. The use of appropriate equivalents is permitted under this Study Plan, suitability being demonstrated by the method verification.

Agrisearch Analytical Pty Ltd will determine the level of residues in bovine tissue samples neck muscle, subcutaneous fat, muscle, liver, peri-renal fat and kidney using the appropriate Agrisearch Analytical Pty Ltd Standard Operating Procedures, work instructions and the method of analysis described above. Agrisearch Analytical Pty Ltd will use their data capture forms.

12.5 Number of Samples to be Analysed

All primary samples will be analysed until residues of buparvaquone in a particular matrix decline to <LOQ for all animals at two consecutive time points, after which no further analyses of that matrix will be required.

12.6 Receipt of Samples

For each tissue sample, the date of receipt, storage conditions during transport and while awaiting analysis, and the date of analysis will be recorded.

12.7 Method Verification

12.7.1 Untreated (Control) Sample Analysis

All untreated samples are to be analysed at least once. Results of duplicate analyses are to be reported individually and not as averages. A separate table is not required if the results of the control experiments are identified as such and are reported with those of the sample analyses.

A minimum of two analyses of untreated samples is required. In cases where there are less than two different untreated (control) samples, a minimum of two analyses over all of the untreated samples must be done.

Results of the analysis of untreated specimens should show negligible interfering substances at the LOQ.

12.7.2 Fortified Control Samples for Recovery Analysis

A random selection of untreated samples to be included in the recovery experiments, using each sample if possible.

Results should be expressed as percentage recoveries corrected for the appropriate control value. Results of duplicate analyses (as percentage recoveries) must be reported individually and not as averages.

At least five untreated control samples fortified at the limit of quantification (LOQ) and five at the higher level which consistent with the level found in the test samples must be successfully analysed and reported. Analysis of untreated control samples fortified at levels covering the range of residues found must be successfully analysed and reported for each type of matrix.

Average recoveries should lie within the range of 70% to 110% with the mean above 70% (after the removal of outliers) and the Relative Standard Deviation (RSD) should be less than 20%.

12.8 Sample Analysis

Samples will be analysed for buparvaquone residues following the GLP procedures of the analytical test site. Sample preparation will be done at the analytical test site.

As the neck muscle samples are being collected to address the issue of injection site residues EMEA CVMP Guideline on Injection Site Residues 13 April 2005 should be followed where relevant. Based on the requirements of this guideline for "core injection site" samples the target weight for the neck muscle samples should be 500 g ± 20% i.e. 400 – 600 g. During sample processing in the laboratory the whole sample must be cryohomogenised before sub-sampling to ensure that the evaluation of the injection site residues is from a representative sample of the entire 500 g ± 20% i.e. 400 – 600 g sample.

All primary samples in this Study Plan (or subsequent amendments) must be analysed and reported up until residues of buparvaquone in a particular matrix decline to <LOQ for all animals at two consecutive time points after which no further analyses of that matrix will be required.

The concentration of sample extracts must be adjusted so that the detector response falls within the calibration range. The results of the analysis of samples that fall outside the calibration need not be reported. This does not apply to those samples that are <LOQ, <LOD or ND where normal analytical criteria apply.

At least one untreated (control) sample and one recovery must be run with each batch of samples.

Numerical values are to be reported for residues between the LOQ and LOD.

12.9 Long-term Storage Stability

Triplicate samples are to be fortified with buparvaquone at LOQ and 10 x LOQ in each matrix and stored under the same conditions as the test samples. These samples are to be analysed at the completion of the study to generate storage stability data equal to the period of time the test samples were stored prior to analysis.

12.10 Analytical Report

The analytical report will contain at least the following information:

- The method(s) used for the analysis.
- A copy of the validation report for the method used for the analysis or a reference to it and confirmation of availability of the report for submission direct to the APVMA if required.
- An explanation of any terms or abbreviations used in the report.
- Sample receipt, preparation and storage, and disposition of the samples at the completion of the study.
- The limit of detection (LOD) and the limit of quantification (LOQ) of the method(s) used including their statistical determination.
- Individual results of the analysis of untreated (control) samples. A separate table is not necessary if these results are included with the results of the sample analysis and identified as the results of untreated samples.
- Individual results of the analysis of untreated fortified samples (as percentage recoveries). These results must include at least the fortification level and the percentage recovery (corrected for the appropriate control value). Individual results are required and not average results of duplicate analyses.
- Individual results of the analysis of the samples uncorrected for control results or recovery of individual analyses must be reported (not averages). Residues of buparvaquone will be determined and reported on an as received basis.
- Representative chromatograms (a minimum of a calibration, untreated sample, treated sample and a fortified untreated sample).
- Any deviations, comments or other information relevant to the analysis that is pertinent to the valid interpretation of the results or specified in APVMA residue method guidelines.

13. Documentation Practices

Documentation will be performed according to Agrisearch Services SOP AD003.

14. Records

The following records as well as those previously mentioned in this Study Plan will be maintained for the field phase of the study:

- Location of the field site and full details of the site.
- Animal details
- Application method and details
- Sampling details
- Post-collection handling of samples
- Details of significant events which may affect the study
- Animal housing and feeding records where applicable
- Meteorological data including details of environmental conditions during the 24 hours preceding first application and the 24 hours after second application - temperature, humidity, wind, percent cloud cover, rainfall.
- Details of any management procedures applied to the test site including the rates, dates and purposes of pesticides, other than those specified in the treatment list, applied to the test animals during the study phase.
- Study specific data where applicable

The following records will be maintained for the analytical phase of the study:

- Certification data – all data pertaining to a site certification of the residue method including Study Plan, recovery data, calibration of instruments and standard data
- All raw data associated with the study, including laboratory work sheets, audit reports, records, notes, chromatographs, computer printouts, etc.
- All data will be presented as individual results, showing both blank and uncorrected values. Averages will be summarised in tables with indications if corrections are made for blanks and recoveries, etc.
- Representative chromatograms of samples including control and recovery samples and standards will be incorporated into the final report and will be labelled with retention times, peak labels, integrations, etc.
- All data pertaining to the storage and handling of samples will be included with the raw data. The exact storage conditions and detailed logs of sample tracking and receipt will be included. Storage conditions during transport and the timeliness of the storage of samples will be noted.

15. Quality Assurance

Both the field and analytical phases of this study will be conducted according to the OECD Principles of Good Laboratory Practice (as revised in 1997). The field sections of the report will be prepared and issued according to SOP AD028. For this Study, Quality Assurance officers will examine the Study Plan, Test Site Notebooks for each field site and the final report. They will also conduct field audits of such activities as treatment applications and sampling, as appropriate, and conduct facility audits at the different facilities to check equipment monitoring records, test substance storage rooms and other items as appropriate. If tests sites have had a facility audit within the previous twelve months, another audit may not be conducted. The analytical laboratory will be audited as required by the relevant SOP of the laboratory.

16. Amendments and Deviations

All amendments to or deviations from an approved Study Plan or SOP and the reasons for the amendments or deviations will be documented, signed by the Study Director, dated and maintained with the Study Plan or SOP. An amendment is defined as any planned permanent change or addition to the Study Plan or SOP (Refer to SOP AD012).

The analytical laboratory will notify the Study Director of any proposed analytical phase related amendments to the Study Plan or referenced SOPs. The Study Director will discuss the proposed amendment with the Principal Investigator (analytical phase). If approved, the Study Director will raise the amendment in accordance with SOP AD009. Any deviations relating to the analytical phase will be assessed by the Principal Investigator (analytical phase) for impact on the study and forwarded to the Study Director. The deviation will then be handled in accordance with SOP AD009.

17. Communication and Agreements

The Study Director will communicate on a regular basis with the Sponsor and the Principal Investigator.

The data generated by the Principal Investigator in charge of the field site will be forwarded to the Study Director on completion of the field work. This will be done by sending the Test Site Notebook to the Study Director. The analytical laboratory will report to the Study Director on a regular basis during the course of the analysis and on completion by submission of a full written report that will be attached to the overall Study Report as an appendix.

The appointed Principal Investigators will agree to conduct their delegated phase in accordance with the Study Plan and the Principles of GLP by way of signature.

18. Storage/Archiving of Records and Materials

Study documents will be securely stored in the archive at Agrisearch Services Pty Ltd, 50 Leewood Drive, Orange, New South Wales according to SOP AD004. The analytical raw data will be archived in the Agrisearch Analytical Pty Ltd archive at Rozelle, New South Wales, Australia.

19. Reporting

The Sponsor will receive a copy of the final report that will include all aspects of the biological and analytical phases of the study. The report will be signed and dated by the Study Director.

The final report will follow APVMA Residue Guideline No. 11 – Reporting of Residue Trials and include as a minimum the following information:

- Title
- Identification of test item
- Certificate of analysis for the test item
- Name and address of the sponsor
- Name and address of the test facility and test sites
- Name and address of the Study Director
- Names and address of each Principal Investigator and the phase of the study to which they are delegated
- Dates of study initiation and completion
- A Quality Assurance statement, signed by the relevant QA personnel, certifying the dates audits were done and the dates any findings were reported to management or the Study Director
- Description of materials and methods used including animal weights and calculated and administered doses
- Reference to test guidelines used
- A summary of the results from field and analytical phases
- Appropriate records taken during the study
- Presentation of the results including statistical analysis where required
- A discussion and conclusion where appropriate
- The location of archived records and materials
- Appendix containing Analytical Report
- Appendix containing Test Site Notebook

20. Referenced Standard Operating Procedures

20.1 Field Phase – Agrisearch Services Pty Ltd

SOP No.	Title
AD002	Procedure for Document and Data Control
AD003	Procedure for Raw Data Recording, Handling and Storage
AD004	Procedure for Archiving
AD009	Procedure for Protocol Amendments and Deviations
AD012	Procedure for Management of Trials and Studies
AD016	Procedure for Receipt, Handling, Storage, Labelling and Disposal of Test Item
AD017	Procedure for Generating Residue Sample Labels
AD018	Procedure for Residue Sample Storage
AD019	Procedure for Packing and Shipping Residue Samples
AD030	Procedure for Education and Training of Study Personnel
EQ005	Procedure for Maintenance, Calibration and Operation of Sheep and Cattle Scales
EQ007	Procedure for use, maintenance and verification of accuracy of temperature measuring equipment
EQ008	Procedure for the Calibration of Syringes, Measuring Cylinders and Volumetric Flasks
AH001	Procedure for Animal Health Trial Design
AH005	Procedure for Sheep and Cattle Residue Sampling

20.2 Analytical Phase – Agrisearch Analytical Pty Ltd

SOP No.	Title
LQM-01	Laboratory Quality Manual
SOP-01	Receipt, Login and Storage of Test Samples & Test Items
SOP-02	Test Method Selection, Use and Control
SOP-03	Raw Data Recording
SOP-04	Control of Records
SOP-06	Good Laboratory Practice – Laboratory Studies
SOP-08	Quantitative Data – Analytical Standards
SOP-12	Test Results – Monitoring Quality
SOP-13	Reports – Production, Issue, Endorsement and Transmission
SOP-15	Estimation of Uncertainty of Measurement
SOP-16	Procedure for Study Plan/Protocol Amendments and Deviations
SOP-18	Validation of Regulatory Test Methods
SOP-34	Sub-Sampling of Residue Samples

Agrisearch Services Pty Ltd
50 Leewood Drive
Orange NSW 2800
Australia

27 April 2012

21.3 Study plan amendments

No.	Date	Description
1	28-May-12	Animal W 1 was sampled from early as a UTC due to it being trampled and unable to recover
2	28-May-12	The allocation of animals changed animals being blocked into 6 blocks of 12 animals with rank 37 becoming the second UTC animal.
3	8-Aug-12	Allocation of animals was conducted on Day -3 rather than -7 due to wet weather
4	22-Aug-12	Study plan was changed to show sampling could be stopped after residues decline to <LOD for two consecutive time points.
5	24-Aug-12	Ian Ridley will take over as Study Director from Veronica Smith
6	10-Oct-12	Samples will be sent on Day 60 rather than Day 58
7	10-Oct-12	Megan Kirby will take over from Ian McRae as Investigator
8	23-Nov-12	Samples will be sent on day 102 rather than 100.
9	29-Apr-13	All reserve samples will be kept for a period of 3 years from the 30 April 2013, along with the listed primary samples which will be sent from Agrisearch Analytical back to Agrisearch Services.

21.4 Study plan deviations

No.	Date	Description
1	10-Oct-12	Sampling from the neck muscle increased from 200g per sample to 400g per sample as the residues in the muscle were less obvious to find.
2	10-Oct-12	Animal G 11-3 was swapped with animal G 5-1 as it was showing symptoms of ill thrift and the decision was made it needed to be sampled from early.
3	16-Nov-12	No animal supplier declaration could be supplied for the second mob of cattle, although they were from a neighbouring property with the same breeding, thus had no major differences.
4	16-Nov-12	Tissue samples were not chilled prior to transport to the main freezer as the temperature at this time was low enough not to require it.
5	21-Nov-12	Animal Red 9-1 was swapped with Blue 12-4 as Red 9-1 had jumped the fence and was unable to be located at the time of sampling.
6	6-Feb-13	There are only 5 animals to be sampled from for Group 12 as the previously swapped animal (Red 9-1) was still unable to be located.
7	5-Apr-13	At the request of the Study Sponsor samples collected on Day 175 and Day 203 were not sent to Agrisearch Analytical for analysis.
8	3-Jul-13	Not all tissue samples were collected as per the study plan due to an unavailability of enough tissue type.
9	15-Jul-13	The same sample shipping chain of custody was sent with the samples sent on 26 November 2012 and 27 November 2012 instead of a separate Chain of Custody for each occasion.

21.5 Certificate of analysis

Vet Pharma Friesoythe GmbH

Quality Control
Certificate of Analysis

Printed on: 04.06.2012

Page 1 of 1

Product	**Butalex , 40 ml**	Manufact. Date	**01/2011**
Batch-No	**1008108**	Expiry Date	**01/2014**
Product-Code	**130000**	Specification	**130000 S03-EZ Rev00**

Test	Result	Limits
Description (a red-brown liquid, practically free from particles)	Complies	Complies
Relative Density	1.000	0.990 - 1.010
Average filling volume	40.7	>= 40.0 ml
Identity	Complies	Complies
Assay Buparvaquone	51.1	45.0 - 55.0 mg / ml
Sterility (no microbial growth)	Complies	Complies

This batch has been manufactured in accordance with cGMP requirements. The batch records are complete and comply with cGMP requirements.

The batch is released for sale !

Friesoythe, 04.06.2012

04. JUNI 2012 i.V.

G.Schulte (Supervisor Quality Service 1)

\\FRILIMD1\LIMS\DATABASE\REPORTS\Essex_az.rpt
08.10.2010

21.6 Laboratory report

A GLP tissue residue study using intramuscular injection of Butalex containing 50 mg/mL Buparvaquone applied to beef cattle – Analytical Phase

Sponsor:	Graham Bailey Department of Primary Industries NSW 1447 Forest Road ORANGE NSW 2800
Study Director:	Ian Ridley Agrisearch Services Pty Ltd 50 Leewood Drive ORANGE NSW 2800
Test Facility	Agrisearch Services Pty Ltd 50 Leewood Drive ORANGE NSW 2800
Test Site: (Analytical)	Agrisearch Analytical Pty Ltd Level 1, 48 Victoria Road ROZELLE NSW 2039
Principal Investigator: (Analytical)	Amy Drewett, BSc (Hons)
Project Analysts:	T Huynh, BChem
Study Number:	DPINSW/GLP/11/01
Analytical Report No:	12-0780

Facility No: 15028
Corporate Site No: 15091
Recognised for compliance with the
OECD Principles of Good Laboratory Practice.

Agrisearch Analytical Pty Ltd
Level 1, 48 Victoria Rd, Rozelle, NSW 2039 P 02 98103666 F 02 98103866 W http://www.agrisearchanalytical.com.au
ABN 25 094 752 959

-CONTENTS-

GLP COMPLIANCE STATEMENT

.....
Amy Drewett
Principal Investigator

The above signature indicates that the laboratory phase of this study has been performed in compliance with the OECD Principles of Good Laboratory Practice (as revised in 1997) OECD-Doc. ENV/MC/CHEM (98)17, Paris, France, 1998.

All data (original and derived) relating to the analytical phase of this study has been obtained according to the procedures herein described and to the Standard Operating Procedures. The analytical phase report provides a correct and faithful record of the results obtained.

In signing this analytical phase report the Principal Investigator accepts the responsibility for the analytical phase of the study.

QUALITY ASSURANCE STATEMENT

.....

Kay Ford
Quality Assurance Manager

Quality Assurance inspections that were made during the course of the analytical phase of this study are shown below:

Date of Inspection	Subject of Inspections	Audit Report Reference	Date Report Submitted to Study Director, Principal Investigator and Management
22 August 2012	Study Plan	DPINSW/GLP/11/01-01	22 August 2012
6 November 2012	Sample Receipt & Sub-Sampling	DPINSW/GLP/11/01-02	6 November 2012
13 November 2012	In-Process	DPINSW/GLP/11/01-03	13 November 2012
19 March 2013 & 10 May 2013	Raw Data & Report	DPINSW/GLP/11/01-04	10 May 2013

The signature above indicates that the Quality Assurance Department of Agrisearch Analytical Pty Ltd performed the audits as listed. The report accurately reflects the raw data.

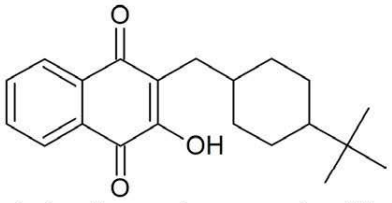
1 SUMMARY

Samples of bovine tissues (liver, kidney, muscle, neck muscle, back fat and peri-renal fat) were submitted to the test site for the determination of buparvaquone residues. The tissue samples were taken from cattle as part of the animal phase of a residue study conducted by Agrisearch Services Pty Ltd. The objective of this study was to determine the depletion profile of buparvaquone from specific tissues (liver, kidney, muscle, neck muscle, back fat and peri-renal fat) following intramuscular administration of BUTALEX at the maximum label rate to beef cattle.

This analytical phase report describes the procedures used for the determination of residues of buparvaquone in bovine tissues. This analytical phase report also details the results of the validation of the analytical method and the results of the analysis of treated samples.

Samples were analysed for residues of buparvaquone using a method of analysis developed at the test site and with analytical reference standards supplied by MSD Animal Health.

Common Name: Buparvaquone
CAS No: 88426-33-9
Structure:



The efficiency of the method at the test site was monitored by the analysis of control (untreated) samples and fortified control (recovery) samples analysed concurrently with the test samples. The average recoveries of buparvaquone from fortified bovine tissues were:

Substrate	Fortification Level (mg/kg)	Number of replicates	Mean Recovery ± RSD (%)
Liver	0.01	8	103 ± 6.3
Liver	0.1	6	93 ± 6.8
Liver	2	1	107
Kidney	0.01	8	102 ± 10
Kidney	0.1	6	99 ± 6.2
Muscle	0.01	10	92 ± 11
Muscle	0.1	6	90 ± 5.9
Muscle	10	5	72 ± 4.6
Muscle	20	2	72
Muscle	30	2	74
Fat	0.01	7	95 ± 14
Fat	0.1	6	104 ± 6.2

RSD = Relative standard deviation (minimum five replicates)

Residues of buparvaquone greater than the limit of quantitation (0.01 mg/kg) were found in most of the treated samples of liver, kidney, muscle and fat. The range of residues found in each substrate at each time point are summarised in the table below:

DAT	Substrate (mg/kg)					
	Liver	Kidney	Muscle	Neck Muscle	Back Fat	Peri-renal Fat
7	1.25 – 1.49	0.29 – 0.34	0.010 – 0.017	34.2 – 1159.0	0.091 – 0.15	0.085 – 0.16
14	1.31 – 1.60	0.26 – 0.31	0.013 – 0.017	103.5 – 715.6	0.050 – 0.10	0.054 – 0.097
28	0.40 – 1.51	0.073 – 0.24	<LOD – 0.016	0.36 – 305.4	<LOQ – 0.055	<LOQ – 0.050
42	0.80 – 1.40	0.12 – 0.25	<LOD – 0.014	0.86 – 235.0	0.011 – 0.059	0.011 – 0.061
56	0.089 – 0.88	0.013 – 0.15	<LOD – <LOQ	4.36 – 132.2	<LOD – 0.022	<LOD – 0.017
70	0.17 – 0.35	0.046 – 0.11	<LOD – 0.010	18.9 – 57.2	<LOQ – 0.016	<LOD – <LOQ
84	0.14 – 0.29	0.052 – 0.090	<LOD – <LOQ	1.95 – 78.7	<LOQ – 0.017	<LOD – <LOQ
98	0.061 – 0.25	0.013 – 0.068	<LOD – <LOQ	0.012 – 72.6	<LOD – 0.011	<LOD – <LOQ
119	0.073 – 0.17	0.015 – 0.054	<LOD	0.031 – 60.5	<LOD	<LOD
147	0.040 – 0.20	<LOQ – 0.038	<LOD	2.79 – 101.1	<LOD	<LOD

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
DAT = Days after treatment

2 EXPERIMENTAL

2.1 Specimen Submission

Two hundred and one samples of bovine tissues (UTC, DAT 7, 14, 28, 42 and 56 samples), each weighing approximately 0.1-0.6 kg, were received by Agrisearch Analytical Pty Ltd frozen on 15 October 2012 from Megan Kirby, Agrisearch Services Pty Ltd, Orange.

One sample of bovine muscle (DAT 7) was received by Agrisearch Analytical Pty Ltd frozen on 25 October 2012 from Megan Kirby, Agrisearch Services Pty Ltd, Orange.

Thirty six samples of bovine tissues (DAT 98 samples), each weighing approximately 0.1-0.5 kg, were received by Agrisearch Analytical Pty Ltd frozen on 26 November 2012 from Megan Kirby, Agrisearch Services Pty Ltd, Orange.

Seventy two samples of bovine tissues (DAT 70 and 84 samples), each weighing approximately 0.1-0.75 kg, were received by Agrisearch Analytical Pty Ltd frozen on 27 November 2012 from Megan Kirby, Agrisearch Services Pty Ltd, Orange.

Thirty five samples of bovine tissues (DAT 119 samples), each weighing approximately 0.1-0.5 kg, were received by Agrisearch Analytical Pty Ltd frozen on 17 December 2012 from Megan Kirby, Agrisearch Services Pty Ltd, Orange.

Thirty seven samples of bovine tissues (DAT 119 and 147 samples), each weighing approximately 0.1-0.5 kg, were received by Agrisearch Analytical Pty Ltd frozen on 14 January 2013 from Megan Kirby, Agrisearch Services Pty Ltd, Orange.

Thirty samples of bovine tissues (DAT 175), each weighing approximately 0.1-0.5 kg, were received by Agrisearch Analytical Pty Ltd frozen on 12 February 2013 from Megan Kirby, Agrisearch Services Pty Ltd, Orange. These samples were sub-sampled but not analysed.

A Chain of Custody form accompanied all of the sample shipments.

The tissue samples were stored in a freezer at approximately -20°C until analysed.

2.2 Specimen Preparation

Each tissue sample was taken and blended with dry ice in a Blixer 3 commercial food processor. Fat samples were not rendered and were tested as received.

The samples were stored at approximately -20°C until analysed.

Samples were sub-sampled between October 2012 and February 2013. Analysis of the tissue samples took place between October 2012 and January 2013. Detailed analysis dates are shown in Tables 5-10.

2.3 Analytical Method

Buparvaquone residues were determined according to an analytical method developed by Agrisearch Analytical Pty Ltd:

> **"Determination of Buparvaquone Residues in Bovine Tissues and Milk by HPLC/MS/MS", AATM-R-170, Revision 1, Agrisearch Analytical Pty Ltd, October 2011.**

A summary of the method is presented below:

> Buparvaquone residues are extracted from bovine tissues with acetonitrile:acetone (8:2). An aliquot of the extract is taken and cleaned up by solid phase extraction (SPE). The sample is eluted in 2% acetic acid in acetonitrile, filtered and analysed for buparvaquone using ultra performance liquid chromatography (UPLC) with negative-ion electrospray ionization (ESI) tandem mass spectrometry (MS/MS).

The above analytical method was validated by fortifying sub-samples of untreated control bovine tissues with known amounts of the test substance buparvaquone. The fortified samples were then analysed using the defined method and the recovery of the test compound was determined.

2.4 Chromatography Conditions

Instrument: ACQUITY UPLC System (Waters) with Xevo TQ-S
MassLynx 4.1 XP Workstation
Column: BEH C18 1.7 µm 50 x 2.1 mm (Waters)
Oven Temperature: 40ºC
Mobile phase: A: 0.01% (v/v) Formic acid and 0.05% (v/v) Ammonium hydroxide in Milli-Q water
B: Acetonitrile

Gradient:

Time(min)	A(%)	B(%)
0	50	50
0.5	50	50
2	0	100
4	50	50

Run Time: 5 minutes
Flow rate: 0.4 mL/minute
Detector: Mode – electrospray negative polarity
Ions:

Compound	RT (min)	Quantifier Precursor	Quantifier Product	Qualifier Precursor	Qualifier Product
Buparvaquone	1.7	325.1	186.0	325.1	297.1

Injection volume: 5 µL

Typical chromatograms for the analysis of buparvaquone in bovine tissues are shown in Figures 6-10.

2.5 Reference Standards

The following analytical grade standards used in this study were supplied by MSD Animal Health:

- Buparvaquone (Purity: 99.68%, Batch: N/A, Expiry: N/A).
- Buparvaquone (Purity: 100.17%, Batch: S789, Expiry: 31 October 2015).

At the commencement of the study, the only analytical standard of buparvaquone available to the test site was the one listed above with a purity of 99.68%. This standard was provided by MSD Animal Health for the initial method development and validation of the buparvaquone method. This analytical standard did not have a certificate of analysis. This analytical standard was used for the analysis of buparvaquone residues in all samples.

The analytical standard of buparvaquone (Batch: S789) was received on 19 February 2013 after all samples (up to and including DAT 147) had been analysed. A standard comparison was performed between the stock standard solutions of both analytical standards and it was found that there was no significant deviation between the two standards.

A Certificate of Analysis of the reference standard (Batch: S789) is shown in Appendix 1.

2.6 Method Validation

2.6.1 Selectivity

The ability of the method to distinguish buparvaquone from other endogenous compounds present in the control samples was demonstrated. Chromatograms were considered acceptable if components present in control extracts, which could potentially interfere with the analysis, were not present at levels of greater than 30% of the limit of quantitation.

2.6.2 Linearity

For liver, in order to establish the linearity of response of the analytical chromatography system to the test substance, ten matrix recovery standards of buparvaquone of increasing concentration were prepared. The lowest concentration was equivalent to at least one third the concentration of a sample at the limit of quantitation. The standard curve was constructed by fortifying blank matrix at the following levels: 0.0025, 0.005, 0.01, 0.025, 0.05, 0.1, 0.2, 0.5, 1 and 5 mg/kg. A minimum of five levels were used to construct any calibration curve. The system linearity was accepted where a statistical analysis showed significant linearity with $r^2 > 0.99$.

For kidney, in order to establish the linearity of response of the analytical chromatography system to the test substance, nine matrix recovery standards of buparvaquone of increasing concentration were prepared. The lowest concentration was equivalent to at least one third the concentration of a sample at the limit of quantitation. The standard curve was constructed by fortifying blank matrix at the following levels: 0.0025, 0.005, 0.01, 0.025, 0.05, 0.1, 0.2, 0.5 and 1 mg/kg. A minimum of six levels were used to construct any calibration curve. The system linearity was accepted where a statistical analysis showed significant linearity with $r^2 > 0.99$.

For muscle, in order to establish the linearity of response of the analytical chromatography system to the test substance, eleven matrix recovery standards of buparvaquone of increasing concentration were prepared. The lowest concentration was equivalent to at least one third the concentration of a sample at the limit of quantitation. The standard curve was constructed by fortifying blank matrix at the following levels: 0.0025, 0.005, 0.01, 0.025, 0.05, 0.1, 0.2, 0.5, 1, 5 and 10 mg/kg. A minimum of five levels were used to construct any calibration curve. The system linearity was accepted where a statistical analysis showed significant linearity with $r^2 > 0.99$.

For the neck muscle samples that were found to be greater than 10 mg/kg, the samples were diluted and analysed against neat standards. In order to establish the linearity of response of the analytical chromatography system to the test substance, nine standards of buparvaquone of increasing concentration were prepared. The standard curve was constructed with the following concentrations: 0.00025, 0.0005, 0.001, 0.005, 0.01, 0.025, 0.05, 0.1 and 1 mg/L in acetonitrile containing 2% acetic acid. A minimum of six levels were used to construct any calibration curve. The system linearity was accepted where a statistical analysis showed significant linearity with $r^2 > 0.99$.

For fat, in order to establish the linearity of response of the analytical chromatography system to the test substance, seven matrix recovery standards of buparvaquone of increasing concentration were prepared. The lowest concentration was equivalent to at least one third the concentration of a sample at the limit of quantitation. The standard curve was constructed by fortifying blank matrix at the following levels: 0.0025, 0.005, 0.01, 0.025, 0.05, 0.1 and 0.2 mg/kg. A minimum of seven levels were used to construct any calibration curve. The system linearity was accepted where a statistical analysis showed significant linearity with $r^2 > 0.99$.

2.6.3 Precision and Accuracy (Recovery)

The reproducibility of the method was demonstrated by analysing at least five replicates at each validation level in bovine tissues. The overall relative standard deviation (RSD) was determined at each fortification level. Precision was considered acceptable if RSD was $\leq$ 20%. The mean recovery at each fortification level was considered acceptable if it was in the range 70-110%. At the LOQ (0.01 mg/kg) the recovery range 60-120% was considered acceptable.

2.6.4 Limit of Quantitation (LOQ)

The limit of quantitation is taken as the lowest fortification level where an acceptable mean recovery (60-120%) and a relative standard deviation of $\leq$20% could be obtained. A limit of quantitation of 0.01 mg/kg was used for buparvaquone in bovine tissues in this study.

2.6.5 Limit of Detection (LOD)

The limit of detection is the smallest measured content of an analyte from which it is possible to deduce the presence of the analyte with reasonable statistical certainty. The limit of detection is estimated as three times the standard deviation (3σ) of recoveries conducted at the lowest fortification level (LOQ). This is expressed via the equation:

LOD (mg/kg) = 3 x σ of the LOQ recoveries (mg/kg)

A limit of detection of 0.005 mg/kg was used for buparvaquone in bovine tissues in this study.

2.6.6 Calculations of Buparvaquone Residues:

A linear regression equation was generated for the analyte's calibration standards with 1/x weighting using the concentration of the analyte (X-axis) versus the analyte peak area (Y-axis, see Figures 1-5). Concentrations of the analyte in the final extracts were determined by substituting the peak area responses into the linear regression equation as shown below:

$Y = aX + b$
With:
Y: Analyte area
X: Analyte concentration in final solution
a: Slope
b: Intercept

Thus:
X (as µg/L) = (Analyte area - b) / a
For the calculation of residues in bovine tissues:
R (mg/kg) = X x MF x 0.001

Where :
R: Residue found in bovine tissues as mg/kg.
X: Final concentration of analyte in extract in µg/L.

MF: Method Factor = $\frac{FV \times EV}{V \times W}$
FV: Final Volume = 5 mL
EV: Raw extract volume: 50 mL
V: Aliquot of extract taken for column clean-up: 4 mL
W: Sample weight: 5 g
MF = $\frac{5 \times 50}{4 \times 5} = 12.5$
0.001: unit conversion factor

Note: For the liver, kidney fat, muscle and neck muscle (<10 mg/kg) samples, matrix recovery standards were used for quantitation. As these were prepared similar to the samples the method factor (MF) = 1.

For the neck muscle samples greater than 10 mg/kg, the samples and high recoveries were diluted 500x and analysed against neat standards (MF = 6250).

3 RESULTS

3.1 Validation Results

3.1.1 Assay Selectivity

Components present in the control sample that interfered with the analysis of buparvaquone were less than 30% of the LOQ. Therefore the method was considered to be specific for bovine tissues. Chromatograms of the control samples are shown in Figures 6-10.

3.1.2 Linearity and Calculations

For liver, the linearity of response of the chromatographic system to buparvaquone was established over the range 2.5 µg/kg to 5000 µg/kg (equivalent to 0.0025 mg/kg to 5 mg/kg in bovine liver (MF = 1, see Section 2.6.6)).

For kidney, the linearity of response of the chromatographic system to buparvaquone was established over the range 2.5 µg/kg to 1000 µg/kg (equivalent to 0.0025 mg/kg to 1 mg/kg in bovine kidney (MF = 1, see Section 2.6.6)).

For muscle, the linearity of response of the chromatographic system to buparvaquone was established over the range 2.5 µg/kg to 10000 µg/kg (equivalent to 0.0025 mg/kg to 10 mg/kg in bovine muscle (MF = 1, see Section 2.6.6)).

For neck muscle (samples greater than 10 mg/kg), the linearity of response of the chromatographic system to buparvaquone was established over the range 0.25 µg/L to 1000 µg/L in solution (equivalent to 1.56 mg/kg to 6250 mg/kg in bovine neck muscle (MF = 6250, see Section 2.6.6)).

For fat, the linearity of response of the chromatographic system to buparvaquone was established over the range 2.5 µg/kg to 200 µg/kg (equivalent to 0.0025 mg/kg to 0.2 mg/kg in bovine fat (MF = 1, see Section 2.6.6)).

A regression line was weighted $\left(1/_{concentration}\right)$ and not forced through the origin. A series of calibration standards were included with the samples in each chromatographic run. The detector response was determined by measuring peak areas for the analyte and sample solution chromatograms. The equation for the calibration curve was calculated using the analyte concentration of the standards and the corresponding areas.

The concentrations in the field and procedural recovery samples were then calculated using the relevant calibration curve. Examples of calibration curves are presented in Figures 1-5.

3.1.3 Precision and Accuracy (Recovery)

Repeatability of the method, expressed as the relative standard deviation (RSD) of the recovery measurements at each fortification level is shown in the table below:

Substrate	Fortification Level (mg/kg)	Number of replicates	Mean Recovery ± RSD (%)
Liver	0.01	8	103 ± 6.3
Liver	0.1	6	93 ± 6.8
Liver	2	1	107
Kidney	0.01	8	102 ± 10
Kidney	0.1	6	99 ± 6.2
Muscle	0.01	10	92 ± 11
Muscle	0.1	6	90 ± 5.9
Muscle	10	5	72 ± 4.6
Muscle	20	2	72
Muscle	30	2	74
Fat	0.01	7	95 ± 14
Fat	0.1	6	104 ± 6.2

RSD = Relative standard deviation (minimum five replicates)

The RSD was ≤20% for buparvaquone at each validation level. Therefore the precision of the method meets the acceptance criteria.

The recovery data for this study meets the criteria for acceptability at the test site (SOP-08) and with APVMA guidelines for acceptable recoveries (accuracy of 70-110%). Detailed results of recovery assays are shown in Tables 1-4.

3.1.4 Limit of Quantitation (LOQ)

Acceptable recovery and precision of buparvaquone were observed at the LOQ fortification level for bovine tissues. An LOQ of 0.01 mg/kg for bovine tissues has been demonstrated. Detailed results of recovery assays are shown in Tables 1-4.

3.1.5 Limit of Detection (LOD)

The limit of detection is calculated as three times the standard deviation (3σ) of the lowest fortification level (LOQ). The results are summarized below:

Compound	Substrate	Level of Fortification (mg/kg)	Standard Deviation (mg/kg)	Limit of Detection† (mg/kg)
Buparvaquone	Liver	0.01001	0.00065	0.002
Buparvaquone	Kidney	0.01001	0.0010	0.003
Buparvaquone	Muscle	0.01001	0.0011	0.003
Buparvaquone	Fat	0.01001	0.0013	0.004

†**Note**: Limit of detection (LOD) = 3 x σ

The calculated LOD for buparvaquone is between 0.002 mg/kg and 0.004 mg/kg. This supports the estimated LOD of the method of 0.005 mg/kg.

3.1.6 Long Term Freezer Stability of Buparvaquone in Test Samples

The elapsed time between first sample collection and final analysis of the treated samples stored in a freezer at -20°C never exceeded 82 days.

Sample Collection Day	Sample Collection Date	Date Analysis Completed	Storage Period (days)
DAT 7	23 August 2012	13 November 2012	82
DAT 14	30 August 2012	13 November 2012	75
DAT 28	13 September 2012	13 November 2012	61
DAT 42	27 September 2012	13 November 2012	47
DAT 56	11 October 2012	13 November 2012	33
DAT 70	25 October 2012	10 December 2012	46
DAT 84	8 November 2012	10 December 2012	32
DAT 98	22 November 2012	10 December 2012	18
DAT 119	13 December 2012	15 January 2013	33
DAT 147	10 January 2013	4 February 2013	25

Triplicate samples of each tissue substrate were fortified with buparvaquone at the LOQ (0.01 mg/kg) and 10 x LOQ (0.1 mg/kg) on 30 October 2012 by Agrisearch Analytical Pty Ltd and were stored at approximately -20°C for 84-87 days. These long term freezer storage stability samples were assayed for buparvaquone content on 22 January 2013, 24 January 2013 and 25 January 2013 (fat, kidney/muscle and liver, respectively). The long term freezer storage stability samples were analysed along with freshly prepared QC recoveries spiked with buparvaquone at 0.01 mg/kg.

The results of the long term freezer stability of buparvaquone in tissue samples that were stored for 84-87 days are presented in the table below:

Matrix	Fortification Level (mg/kg)	Mean Recovery of Freezer Storage Samples* (%)	Recovery of Freshly Prepared QC Samples (%)
Liver	0.01001	89	101
Liver	0.1001	81	
Kidney	0.01001	104	91
Kidney	0.1001	101	
Muscle	0.01001	95	107
Muscle	0.1001	96	
Fat	0.01001	78	83
Fat	0.1001	96	

***Note**: Mean of 3 replicate samples spiked at two fortification levels and stored for 84 days for fat, 86 days for muscle and kidney and 87 days for liver stored at approximately -20°C.

The buparvaquone content of liver, kidney, muscle and fat samples shows no significant degradation after 84-87 days freezer storage (at approximately -20°C).

The detailed results of long term freezer stability of buparvaquone in test samples and concurrent analysed freshly prepared QC recoveries are presented in Table 11.

3.2 Field Trial Specimen Analyses

Residues of buparvaquone greater than the limit of quantitation (0.01 mg/kg) were found in most of the treated samples of liver, kidney muscle and fat.

No significant additional peaks were observed in the chromatograms of treated samples compared to control samples from 1.4-2.1 minutes of the analysis window using the chromatography conditions specified in Section 2.4. Refer to the chromatograms of treated samples and control samples in Figures 6-10.

Detailed results of residue analysis of samples are shown in Tables 5-10.

Typical chromatograms of buparvaquone in bovine tissues are shown in Figures 6-10. Typical calibration curves for buparvaquone standards are shown in Figures 1-5.

4 REFERENCES

4.1 "Determination of Buparvaquone Residues in Bovine Tissues and Milk by HPLC/MS/MS", AATM-R-170, Revision 1, Agrisearch Analytical Pty Ltd, October 2011.

4.2 "SOP-08 Quantitative Data – Analytical Standards", Revision 24, Agrisearch Analytical Pty Ltd, November, 2011.

4.3 "Residue analytical method" Residue Guideline No. 19 Australian Pesticides and Veterinary Medicines Authority, February 2000.

4.4 "Guidelines on Pesticide Residue Trials to provide Data for the registration of Pesticides and the Establishment of Maximum Residue Limits", Food and Agriculture Organisation of the United Nations, Rome, 1986.

4.5 "SOP-18 Validation of Regulatory Test Methods", Revision 5, Agrisearch Analytical Pty Ltd, March, 2012.

4.6 "Maximum residue limit proposals at or about the limit of analytical quantitation" Residue Guideline No.4, Australian Pesticides and Veterinary Medicines Authority, Feb. 2000.

4.7 "SOP-35 Disposal of Test Samples & Test Items", Revision 3, Agrisearch Analytical Pty Ltd, April, 2013.

5 ARCHIVING

All documents relating to the analytical phase of this study including chromatograms, raw data, audit reports and the final analytical phase report will be stored in the GLP archive cabinet at Agrisearch Analytical Pty Ltd, Level 1, 48 Victoria Road, Rozelle, New South Wales, 2039.

6 SAMPLE DISPOSAL

Six weeks following the issue of this analytical phase report, Agrisearch Analytical will notify the Sponsor of intent to dispose of samples by way of issue of a Disposal Notice. Once a signed Disposal Notice is received from the Sponsor, Agrisearch Analytical will dispose of all samples pertaining to this study according to its SOP-35, Disposal of Test Samples & Test Items, Revision 3.

7 TABLES

7.1 Tables of Recovery Data

7.1.1 Table 1: Recovery of Buparvaquone from Fortified Bovine Liver

Lab No.	Substrate	Fortification Level (mg/kg)	Level Found Control (mg/kg)	Level Found (mg/kg)	Recovery (%)
12-0780-10R1	Liver	0.01001	<LOD	0.00970	97
12-0780-10R2	Liver	0.01001	<LOD	0.01056	106
12-0780-10R3	Liver	0.01001	<LOD	0.00964	96
12-0780-10R4	Liver	0.01001	<LOD	0.01144	114
12-0780-10R5	Liver	0.01001	<LOD	0.00960	96
12-0780-10R22	Liver	0.01001	<LOD	0.01060	106
12-0780-04R6	Liver	0.01001	<LOD	0.01070	107
12-0780-04R15	Liver	0.01001	<LOD	0.01014	101
				Mean(±RSD)=	103 ± 6.3
12-0780-04R1	Liver	0.1001	<LOD	0.08494	85
12-0780-04R2	Liver	0.1001	<LOD	0.08687	87
12-0780-04R3	Liver	0.1001	<LOD	0.09466	95
12-0780-04R4	Liver	0.1001	<LOD	0.09778	98
12-0780-04R5	Liver	0.1001	<LOD	0.1013	101
12-0780-10R23	Liver	0.1001	<LOD	0.09552	95
				Mean(±RSD)=	93 ± 6.8
12-0780-10R24	Liver	2.002	<LOD	2.147	107

Note: Recovery (%) = $\frac{(\text{Level Found- Level in Control}) \times 100}{\text{Fortification Level}}$

Note: Results of test samples are **not** corrected for recovery.

7.1.2 Table 2: Recovery of Buparvaquone from Fortified Bovine Kidney

Lab No.	Substrate	Fortification Level (mg/kg)	Level Found Control (mg/kg)	Level Found (mg/kg)	Recovery (%)
12-0780-06R1	Kidney	0.01001	<LOD	0.00996	100
12-0780-06R2	Kidney	0.01001	<LOD	0.01071	107
12-0780-06R3	Kidney	0.01001	<LOD	0.01213	121
12-0780-06R4	Kidney	0.01001	<LOD	0.01026	103
12-0780-06R5	Kidney	0.01001	<LOD	0.01070	107
12-0780-12R21	Kidney	0.01001	<LOD	0.00884	88
12-0780-06R6	Kidney	0.01001	<LOD	0.00976	98
12-0780-06R14	Kidney	0.01001	<LOD	0.00912	91
				Mean(±RSD)=	102 ± 10
12-0780-12R1	Kidney	0.1001	<LOD	0.09871	99
12-0780-12R2	Kidney	0.1001	<LOD	0.1019	102
12-0780-12R3	Kidney	0.1001	<LOD	0.1068	107
12-0780-12R4	Kidney	0.1001	<LOD	0.1022	102
12-0780-12R5	Kidney	0.1001	<LOD	0.09817	98
12-0780-12R22	Kidney	0.1001	<LOD	0.08853	88
				Mean(±RSD)=	99 ± 6.2

Note: Recovery (%) = $\frac{\text{(Level Found- Level in Control) x 100}}{\text{Fortification Level}}$

Note: Results of test samples are **not** corrected for recovery.

7.1.3 Table 3: Recovery of Buparvaquone from Fortified Bovine Muscle

Lab No.	Substrate	Fortification Level (mg/kg)	Level Found Control (mg/kg)	Level Found (mg/kg)	Recovery (%)
12-0780-09R2	Muscle	0.01001	<LOD	0.00959	96
12-0780-09R3	Muscle	0.01001	<LOD	0.00958	96
12-0780-09R4	Muscle	0.01001	<LOD	0.00799	80
12-0780-09R5	Muscle	0.01001	<LOD	0.00777	78
12-0780-09R23	Muscle	0.01001	<LOD	0.00997	100
12-0780-01R6	Muscle	0.01001	<LOD	0.01043	104
12-0780-11R1	Muscle	0.01001	<LOD	0.00965	96
12-0780-03R1	Muscle	0.01001	<LOD	0.00792	79
12-0780-01R21	Muscle	0.01001	<LOD	0.00889	89
12-0780-03R9	Muscle	0.01001	<LOD	0.01071	107
				Mean(±RSD)=	92 ± 11
12-0780-01R1	Muscle	0.1001	<LOD	0.08453	84
12-0780-01R2	Muscle	0.1001	<LOD	0.08560	86
12-0780-01R3	Muscle	0.1001	<LOD	0.08776	88
12-0780-01R4	Muscle	0.1001	<LOD	0.08957	89
12-0780-01R5	Muscle	0.1001	<LOD	0.09635	96
12-0780-09R24	Muscle	0.1001	<LOD	0.09677	97
				Mean(±RSD)=	90 ± 5.9
12-0780-09CR33	Muscle	10.01	<LOD	7.571	76
12-0780-01R7	Muscle	10.01	<LOD	7.510	75
12-0780-01CR18	Muscle	10.01	<LOD	7.231	72
12-0780-01CR32	Muscle	10.01	<LOD	7.109	71
12-0780-01CR44	Muscle	10.01	<LOD	6.755	67
				Mean(±RSD)=	72 ± 4.6
12-0780-09CR34	Muscle	20.02	<LOD	14.92	75
12-0780-01CR19	Muscle	20.02	<LOD	14.06	70
				Mean =	72
12-0780-09CR35	Muscle	30.02	<LOD	21.84	73
12-0780-01CR20	Muscle	30.02	<LOD	22.49	75
				Mean =	74

Note: Recovery (%) = $\frac{(\text{Level Found- Level in Control}) \times 100}{\text{Fortification Level}}$

Note: Results of test samples are **not** corrected for recovery.

7.1.4 Table 4: Recovery of Buparvaquone from Fortified Bovine Fat

Lab No.	Substrate	Fortification Level (mg/kg)	Level Found Control (mg/kg)	Level Found (mg/kg)	Recovery (%)
12-0780-05R1	Fat	0.01001	<LOD	0.00805	80
12-0780-05R2	Fat	0.01001	<LOD	0.00866	87
12-0780-05R3	Fat	0.01001	<LOD	0.01109	111
12-0780-05R4	Fat	0.01001	<LOD	0.01142	114
12-0780-05R5	Fat	0.01001	<LOD	0.00990	99
12-0780-05R13	Fat	0.01001	<LOD	0.00942	94
12-0780-11R9	Fat	0.01001	<LOD	0.00835	83
				Mean(±RSD)=	95 ± 14
12-0780-08R1	Fat	0.1001	<LOD	0.09786	98
12-0780-08R2	Fat	0.1001	<LOD	0.09935	99
12-0780-08R3	Fat	0.1001	<LOD	0.1015	101
12-0780-08R4	Fat	0.1001	<LOD	0.1125	112
12-0780-08R5	Fat	0.1001	<LOD	0.1123	112
12-0780-05R14	Fat	0.1001	<LOD	0.1021	102
				Mean(±RSD)=	104 ± 6.2

Note: Recovery (%) = $\frac{(\text{Level Found- Level in Control}) \times 100}{\text{Fortification Level}}$

Note: Results of test samples are **not** corrected for recovery.

7.2 Tables of Residue Data

7.2.1 Table 5: Residues of Buparvaquone in Bovine Liver Following Treatment with BUTALEX

Laboratory Specimen Number	Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
12-0780-04	12-0419-04	UTC	-80 DAT	28-May-12	13-Nov-12	<LOD
12-0780-10	12-0419-16	UTC	6 DAT	22-Aug-12	13-Nov-12	<LOD
12-0780-16	12-0419-28	2.5	7 DAT	23-Aug-12	13-Nov-12	1.25
12-0780-22	12-0419-40	2.5	7 DAT	23-Aug-12	13-Nov-12	1.49
12-0780-28	12-0419-52	2.5	7 DAT	23-Aug-12	13-Nov-12	1.41
12-0780-34	12-0419-64	2.5	7 DAT	23-Aug-12	13-Nov-12	1.42
12-0780-40	12-0419-76	2.5	7 DAT	23-Aug-12	13-Nov-12	1.37
12-0780-46	12-0419-88	2.5	7 DAT	23-Aug-12	13-Nov-12	1.32
12-0780-52	12-0419-100	2.5	14 DAT	30-Aug-12	13-Nov-12	1.40
12-0780-58	12-0419-112	2.5	14 DAT	30-Aug-12	13-Nov-12	1.41
12-0780-64	12-0419-124	2.5	14 DAT	30-Aug-12	13-Nov-12	1.55
12-0780-70	12-0419-136	2.5	14 DAT	30-Aug-12	13-Nov-12	1.43
12-0780-76	12-0419-148	2.5	14 DAT	30-Aug-12	13-Nov-12	1.31
12-0780-82	12-0419-160	2.5	14 DAT	30-Aug-12	13-Nov-12	1.60
12-0780-88	12-0419-172	2.5	28 DAT	13-Sep-12	13-Nov-12	1.44
12-0780-94	12-0419-184	2.5	28 DAT	13-Sep-12	13-Nov-12	1.51
12-0780-100	12-0419-196	2.5	28 DAT	13-Sep-12	13-Nov-12	0.40
12-0780-106	12-0419-208	2.5	28 DAT	13-Sep-12	13-Nov-12	1.30
12-0780-112	12-0419-220	2.5	28 DAT	13-Sep-12	13-Nov-12	1.27
12-0780-118	12-0419-232	2.5	28 DAT	13-Sep-12	13-Nov-12	1.12
12-0780-124	12-0419-244	2.5	42 DAT	27-Sep-12	13-Nov-12	1.40
12-0780-130	12-0419-256	2.5	42 DAT	27-Sep-12	13-Nov-12	0.80
12-0780-136	12-0419-268	2.5	42 DAT	27-Sep-12	13-Nov-12	0.91
12-0780-142	12-0419-280	2.5	42 DAT	27-Sep-12	13-Nov-12	1.17
12-0780-148	12-0419-292	2.5	42 DAT	27-Sep-12	13-Nov-12	1.14
12-0780-154	12-0419-304	2.5	42 DAT	27-Sep-12	13-Nov-12	1.19
12-0780-160	12-0419-316	2.5	56 DAT	11-Oct-12	13-Nov-12	0.15
12-0780-166	12-0419-328	2.5	56 DAT	11-Oct-12	13-Nov-12	0.51
12-0780-172	12-0419-340	2.5	56 DAT	11-Oct-12	13-Nov-12	0.88
12-0780-178	12-0419-352	2.5	56 DAT	11-Oct-12	13-Nov-12	0.59
12-0780-184	12-0419-364	2.5	56 DAT	11-Oct-12	13-Nov-12	0.61
12-0780-190	12-0419-376	2.5	56 DAT	11-Oct-12	13-Nov-12	0.089

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Table 5 (Continued): Residues of Buparvaquone in Bovine Liver Following Treatment with BUTALEX

Laboratory Specimen Number	Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
12-0780-291	120419-388	2.5	70 DAT	25-Oct-12	06-Dec-12	0.28
12-0780-292	120419-400	2.5	70 DAT	25-Oct-12	06-Dec-12	0.18
12-0780-293	120419-412	2.5	70 DAT	25-Oct-12	06-Dec-12	0.31
12-0780-294	120419-424	2.5	70 DAT	25-Oct-12	06-Dec-12	0.17
12-0780-295	120419-436	2.5	70 DAT	25-Oct-12	06-Dec-12	0.35
12-0780-296	120419-448	2.5	70 DAT	25-Oct-12	06-Dec-12	0.33
12-0780-297	120419-460	2.5	84 DAT	08-Nov-12	06-Dec-12	0.14
12-0780-298	120419-472	2.5	84 DAT	08-Nov-12	06-Dec-12	0.25
12-0780-299	120419-484	2.5	84 DAT	08-Nov-12	06-Dec-12	0.16
12-0780-300	120419-496	2.5	84 DAT	08-Nov-12	06-Dec-12	0.28
12-0780-301	120419-508	2.5	84 DAT	08-Nov-12	06-Dec-12	0.29
12-0780-302	120419-520	2.5	84 DAT	08-Nov-12	06-Dec-12	0.29
12-0780-243	120419-532	2.5	98 DAT	22-Nov-12	06-Dec-12	0.25
12-0780-244	120419-544	2.5	98 DAT	22-Nov-12	06-Dec-12	0.19
12-0780-245	120419-556	2.5	98 DAT	22-Nov-12	06-Dec-12	0.061
12-0780-246	120419-568	2.5	98 DAT	22-Nov-12	06-Dec-12	0.091
12-0780-247	120419-580	2.5	98 DAT	22-Nov-12	06-Dec-12	0.066
12-0780-248	120419-592	2.5	98 DAT	22-Nov-12	06-Dec-12	0.25
12-0780-351	12-0419-604	2.5	119 DAT	13-Dec-12	11-Jan-13	0.083
12-0780-352	12-0419-616	2.5	119 DAT	13-Dec-12	11-Jan-13	0.073
12-0780-353	12-0419-628	2.5	119 DAT	13-Dec-12	11-Jan-13	0.075
12-0780-354	12-0419-640	2.5	119 DAT	13-Dec-12	11-Jan-13	0.097
12-0780-355	12-0419-652	2.5	119 DAT	13-Dec-12	11-Jan-13	0.17
12-0780-356	12-0419-664	2.5	119 DAT	13-Dec-12	11-Jan-13	0.085
12-0780-387	12-0419-676	2.5	147 DAT	10-Jan-13	25-Jan-13	0.050
12-0780-388	12-0419-688	2.5	147 DAT	10-Jan-13	25-Jan-13	0.17
12-0780-389	12-0419-700	2.5	147 DAT	10-Jan-13	25-Jan-13	0.095
12-0780-390	12-0419-712	2.5	147 DAT	10-Jan-13	25-Jan-13	0.20
12-0780-391	12-0419-724	2.5	147 DAT	10-Jan-13	25-Jan-13	0.040
12-0780-392	12-0419-736	2.5	147 DAT	10-Jan-13	25-Jan-13	0.17

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

7.2.2 Table 6: Residues of Buparvaquone in Bovine Kidney Following Treatment with BUTALEX

Laboratory Specimen Number	Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
12-0780-06	12-0419-06	UTC	-80 DAT	28-May-12	05-Nov-12	<LOD
12-0780-12	12-0419-18	UTC	6 DAT	22-Aug-12	05-Nov-12	<LOD
12-0780-18	12-0419-30	2.5	7 DAT	23-Aug-12	05-Nov-12	0.29
12-0780-24	12-0419-42	2.5	7 DAT	23-Aug-12	05-Nov-12	0.29
12-0780-30	12-0419-54	2.5	7 DAT	23-Aug-12	05-Nov-12	0.34
12-0780-36	12-0419-66	2.5	7 DAT	23-Aug-12	05-Nov-12	0.30
12-0780-42	12-0419-78	2.5	7 DAT	23-Aug-12	05-Nov-12	0.33
12-0780-48	12-0419-90	2.5	7 DAT	23-Aug-12	05-Nov-12	0.31
12-0780-54	12-0419-102	2.5	14 DAT	30-Aug-12	05-Nov-12	0.28
12-0780-60	12-0419-114	2.5	14 DAT	30-Aug-12	05-Nov-12	0.26
12-0780-66	12-0419-126	2.5	14 DAT	30-Aug-12	05-Nov-12	0.30
12-0780-72	12-0419-138	2.5	14 DAT	30-Aug-12	05-Nov-12	0.30
12-0780-78	12-0419-150	2.5	14 DAT	30-Aug-12	05-Nov-12	0.31
12-0780-84	12-0419-162	2.5	14 DAT	30-Aug-12	05-Nov-12	0.27
12-0780-90	12-0419-174	2.5	28 DAT	13-Sep-12	05-Nov-12	0.24
12-0780-96	12-0419-186	2.5	28 DAT	13-Sep-12	05-Nov-12	0.24
12-0780-102	12-0419-198	2.5	28 DAT	13-Sep-12	05-Nov-12	0.073
12-0780-108	12-0419-210	2.5	28 DAT	13-Sep-12	05-Nov-12	0.21
12-0780-114	12-0419-222	2.5	28 DAT	13-Sep-12	05-Nov-12	0.24
12-0780-120	12-0419-234	2.5	28 DAT	13-Sep-12	05-Nov-12	0.20
12-0780-126	12-0419-246	2.5	42 DAT	27-Sep-12	05-Nov-12	0.25
12-0780-132	12-0419-258	2.5	42 DAT	27-Sep-12	05-Nov-12	0.12
12-0780-138	12-0419-270	2.5	42 DAT	27-Sep-12	05-Nov-12	0.20
12-0780-144	12-0419-282	2.5	42 DAT	27-Sep-12	05-Nov-12	0.22
12-0780-150	12-0419-294	2.5	42 DAT	27-Sep-12	05-Nov-12	0.19
12-0780-156	12-0419-306	2.5	42 DAT	27-Sep-12	05-Nov-12	0.21
12-0780-162	12-0419-318	2.5	56 DAT	11-Oct-12	05-Nov-12	0.056
12-0780-168	12-0419-330	2.5	56 DAT	11-Oct-12	05-Nov-12	0.10
12-0780-174	12-0419-342	2.5	56 DAT	11-Oct-12	05-Nov-12	0.15
12-0780-180	12-0419-354	2.5	56 DAT	11-Oct-12	05-Nov-12	0.13
12-0780-186	12-0419-366	2.5	56 DAT	11-Oct-12	05-Nov-12	0.12
12-0780-192	12-0419-378	2.5	56 DAT	11-Oct-12	05-Nov-12	0.013

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Table 6 (Continued): Residues of Buparvaquone in Bovine Kidney Following Treatment with BUTALEX

Laboratory Specimen Number	Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
12-0780-279	120419-390	2.5	70 DAT	25-Oct-12	05-Dec-12	0.083
12-0780-280	120419-402	2.5	70 DAT	25-Oct-12	05-Dec-12	0.046
12-0780-281	120419-414	2.5	70 DAT	25-Oct-12	05-Dec-12	0.096
12-0780-282	120419-426	2.5	70 DAT	25-Oct-12	05-Dec-12	0.066
12-0780-283	120419-438	2.5	70 DAT	25-Oct-12	05-Dec-12	0.11
12-0780-284	120419-450	2.5	70 DAT	25-Oct-12	05-Dec-12	0.089
12-0780-285	120419-462	2.5	84 DAT	08-Nov-12	05-Dec-12	0.052
12-0780-286	120419-474	2.5	84 DAT	08-Nov-12	05-Dec-12	0.080
12-0780-287	120419-486	2.5	84 DAT	08-Nov-12	05-Dec-12	0.054
12-0780-288	120419-498	2.5	84 DAT	08-Nov-12	05-Dec-12	0.090
12-0780-289	120419-510	2.5	84 DAT	08-Nov-12	05-Dec-12	0.065
12-0780-290	120419-522	2.5	84 DAT	08-Nov-12	05-Dec-12	0.079
12-0780-237	120419-534	2.5	98 DAT	22-Nov-12	05-Dec-12	0.068
12-0780-238	120419-546	2.5	98 DAT	22-Nov-12	05-Dec-12	0.051
12-0780-239	120419-558	2.5	98 DAT	22-Nov-12	05-Dec-12	0.013
12-0780-240	120419-570	2.5	98 DAT	22-Nov-12	05-Dec-12	0.027
12-0780-241	120419-582	2.5	98 DAT	22-Nov-12	05-Dec-12	0.023
12-0780-242	120419-594	2.5	98 DAT	22-Nov-12	05-Dec-12	0.060
12-0780-345	12-0419-606	2.5	119 DAT	13-Dec-12	15-Jan-13	0.015
12-0780-346	12-0419-618	2.5	119 DAT	13-Dec-12	15-Jan-13	0.031
12-0780-347	12-0419-630	2.5	119 DAT	13-Dec-12	15-Jan-13	0.023
12-0780-348	12-0419-642	2.5	119 DAT	13-Dec-12	15-Jan-13	0.033
12-0780-349	12-0419-654	2.5	119 DAT	13-Dec-12	15-Jan-13	0.054
12-0780-350	12-0419-666	2.5	119 DAT	13-Dec-12	15-Jan-13	0.026
12-0780-381	12-0419-678	2.5	147 DAT	10-Jan-13	24-Jan-13	0.013
12-0780-382	12-0419-690	2.5	147 DAT	10-Jan-13	24-Jan-13	0.033
12-0780-383	12-0419-702	2.5	147 DAT	10-Jan-13	24-Jan-13	0.024
12-0780-384	12-0419-714	2.5	147 DAT	10-Jan-13	24-Jan-13	0.038
12-0780-385	12-0419-726	2.5	147 DAT	10-Jan-13	24-Jan-13	0.009*
12-0780-386	12-0419-738	2.5	147 DAT	10-Jan-13	24-Jan-13	0.034

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Note: Results marked with * are between LOD and LOQ, as the reported values are less than the LOQ, by definition, their accuracy and precision cannot be verified.

7.2.3 Table 7: Residues of Buparvaquone in Bovine Muscle Following Treatment with BUTALEX

Laboratory Specimen Number	Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
12-0780-03	12-0419-03	2.5	-80 DAT	28-May-12	08-Nov-12	<LOD
12-0780-09	12-0419-15	2.5	6 DAT	22-Aug-12	08-Nov-12	<LOD
12-0780-15	12-0419-27	2.5	7 DAT	23-Aug-12	08-Nov-12	0.017
12-0780-21	12-0419-39	2.5	7 DAT	23-Aug-12	08-Nov-12	0.015
12-0780-27	12-0419-51	2.5	7 DAT	23-Aug-12	08-Nov-12	0.015
12-0780-33	12-0419-63	2.5	7 DAT	23-Aug-12	08-Nov-12	0.010
12-0780-39	12-0419-75	2.5	7 DAT	23-Aug-12	08-Nov-12	0.016
12-0780-45	12-0419-87	2.5	7 DAT	23-Aug-12	08-Nov-12	0.016
12-0780-51	12-0419-99	2.5	14 DAT	30-Aug-12	08-Nov-12	0.014
12-0780-57	12-0419-111	2.5	14 DAT	30-Aug-12	08-Nov-12	0.013
12-0780-63	12-0419-123	2.5	14 DAT	30-Aug-12	08-Nov-12	0.014
12-0780-69	12-0419-135	2.5	14 DAT	30-Aug-12	08-Nov-12	0.016
12-0780-75	12-0419-147	2.5	14 DAT	30-Aug-12	08-Nov-12	0.013
12-0780-81	12-0419-159	2.5	14 DAT	30-Aug-12	08-Nov-12	0.017
12-0780-87	12-0419-171	2.5	28 DAT	13-Sep-12	08-Nov-12	0.013
12-0780-93	12-0419-183	2.5	28 DAT	13-Sep-12	08-Nov-12	0.013
12-0780-99	12-0419-195	2.5	28 DAT	13-Sep-12	08-Nov-12	<LOD
12-0780-105	12-0419-207	2.5	28 DAT	13-Sep-12	08-Nov-12	0.013
12-0780-111	12-0419-219	2.5	28 DAT	13-Sep-12	08-Nov-12	0.016
12-0780-117	12-0419-231	2.5	28 DAT	13-Sep-12	08-Nov-12	0.009*
12-0780-123	12-0419-243	2.5	42 DAT	27-Sep-12	08-Nov-12	0.014
12-0780-129	12-0419-255	2.5	42 DAT	27-Sep-12	08-Nov-12	<LOD
12-0780-135	12-0419-267	2.5	42 DAT	27-Sep-12	08-Nov-12	0.010
12-0780-141	12-0419-279	2.5	42 DAT	27-Sep-12	08-Nov-12	0.012
12-0780-147	12-0419-291	2.5	42 DAT	27-Sep-12	08-Nov-12	0.012
12-0780-153	12-0419-303	2.5	42 DAT	27-Sep-12	08-Nov-12	0.010
12-0780-159	12-0419-315	2.5	56 DAT	11-Oct-12	08-Nov-12	<LOD
12-0780-165	12-0419-327	2.5	56 DAT	11-Oct-12	08-Nov-12	<LOD
12-0780-171	12-0419-339	2.5	56 DAT	11-Oct-12	08-Nov-12	0.009*
12-0780-177	12-0419-351	2.5	56 DAT	11-Oct-12	08-Nov-12	0.009*
12-0780-183	12-0419-363	2.5	56 DAT	11-Oct-12	08-Nov-12	0.006*
12-0780-189	12-0419-375	2.5	56 DAT	11-Oct-12	08-Nov-12	<LOD

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Note: Results marked with * are between LOD and LOQ, as the reported values are less than the LOQ, by definition, their accuracy and precision cannot be verified.

Table 7 (Continued): Residues of Buparvaquone in Bovine Muscle Following Treatment with BUTALEX

Laboratory Specimen Number	Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
12-0780-303	120419-387	2.5	70 DAT	25-Oct-12	04-Dec-12	0.007*
12-0780-304	120419-399	2.5	70 DAT	25-Oct-12	04-Dec-12	<LOD
12-0780-305	120419-411	2.5	70 DAT	25-Oct-12	04-Dec-12	0.010
12-0780-306	120419-423	2.5	70 DAT	25-Oct-12	04-Dec-12	0.005*
12-0780-307	120419-435	2.5	70 DAT	25-Oct-12	04-Dec-12	0.008*
12-0780-308	120419-447	2.5	70 DAT	25-Oct-12	04-Dec-12	0.007*
12-0780-309	120419-459	2.5	84 DAT	08-Nov-12	04-Dec-12	<LOD
12-0780-310	120419-471	2.5	84 DAT	08-Nov-12	04-Dec-12	0.007*
12-0780-311	120419-483	2.5	84 DAT	08-Nov-12	04-Dec-12	<LOD
12-0780-312	120419-495	2.5	84 DAT	08-Nov-12	04-Dec-12	0.008*
12-0780-313	120419-507	2.5	84 DAT	08-Nov-12	04-Dec-12	0.008*
12-0780-314	120419-519	2.5	84 DAT	08-Nov-12	04-Dec-12	0.007*
12-0780-249	120419-531	2.5	98 DAT	22-Nov-12	04-Dec-12	0.006*
12-0780-250	120419-543	2.5	98 DAT	22-Nov-12	04-Dec-12	0.006*
12-0780-251	120419-555	2.5	98 DAT	22-Nov-12	04-Dec-12	<LOD
12-0780-252	120419-567	2.5	98 DAT	22-Nov-12	04-Dec-12	<LOD
12-0780-253	120419-579	2.5	98 DAT	22-Nov-12	04-Dec-12	<LOD
12-0780-254	120419-591	2.5	98 DAT	22-Nov-12	04-Dec-12	0.006*
12-0780-357	12-0419-603	2.5	119 DAT	13-Dec-12	11-Jan-13	<LOD
12-0780-358	12-0419-615	2.5	119 DAT	13-Dec-12	11-Jan-13	<LOD
12-0780-359	12-0419-627	2.5	119 DAT	13-Dec-12	11-Jan-13	<LOD
12-0780-360	12-0419-639	2.5	119 DAT	13-Dec-12	11-Jan-13	<LOD
12-0780-361	12-0419-651	2.5	119 DAT	13-Dec-12	11-Jan-13	<LOD
12-0780-362	12-0419-663	2.5	119 DAT	13-Dec-12	11-Jan-13	<LOD
12-0780-393	12-0419-675	2.5	147 DAT	10-Jan-13	24-Jan-13	<LOD
12-0780-394	12-0419-687	2.5	147 DAT	10-Jan-13	24-Jan-13	<LOD
12-0780-395	12-0419-699	2.5	147 DAT	10-Jan-13	24-Jan-13	<LOD
12-0780-396	12-0419-711	2.5	147 DAT	10-Jan-13	24-Jan-13	<LOD
12-0780-397	12-0419-723	2.5	147 DAT	10-Jan-13	24-Jan-13	<LOD
12-0780-398	12-0419-735	2.5	147 DAT	10-Jan-13	24-Jan-13	<LOD

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Note: Results marked with * are between LOD and LOQ, as the reported values are less than the LOQ, by definition, their accuracy and precision cannot be verified.

7.2.4 Table 8: Residues of Buparvaquone in Bovine Neck Muscle Following Treatment with BUTALEX

Laboratory Specimen Number	Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
12-0780-01	12-0419-01	2.5	-80 DAT	28-May-12	08-Nov-12	<LOD
12-0780-07	12-0419-13	2.5	6 DAT	22-Aug-12	08-Nov-12	<LOD
12-0780-13	12-0419-25	2.5	7 DAT	23-Aug-12	08-Nov-12	734.8
12-0780-19	12-0419-37	2.5	7 DAT	23-Aug-12	08-Nov-12	158.0
12-0780-25	12-0419-49	2.5	7 DAT	23-Aug-12	08-Nov-12	34.2
12-0780-31	12-0419-61	2.5	7 DAT	23-Aug-12	08-Nov-12	140.5
12-0780-37	12-0419-73	2.5	7 DAT	23-Aug-12	08-Nov-12	1159.0
12-0780-43	12-0419-85	2.5	7 DAT	23-Aug-12	08-Nov-12	232.5
12-0780-49	12-0419-97	2.5	14 DAT	30-Aug-12	08-Nov-12	715.6
12-0780-55	12-0419-109	2.5	14 DAT	30-Aug-12	08-Nov-12	103.5
12-0780-61	12-0419-121	2.5	14 DAT	30-Aug-12	08-Nov-12	458.1
12-0780-67	12-0419-133	2.5	14 DAT	30-Aug-12	08-Nov-12	205.9
12-0780-73	12-0419-145	2.5	14 DAT	30-Aug-12	08-Nov-12	309.2
12-0780-79	12-0419-157	2.5	14 DAT	30-Aug-12	08-Nov-12	539.3
12-0780-85	12-0419-169	2.5	28 DAT	13-Sep-12	08-Nov-12	305.4
12-0780-91	12-0419-181	2.5	28 DAT	13-Sep-12	08-Nov-12	228.8
12-0780-97	12-0419-193	2.5	28 DAT	13-Sep-12	08-Nov-12	0.36
12-0780-103	12-0419-205	2.5	28 DAT	13-Sep-12	08-Nov-12	111.5
12-0780-109	12-0419-217	2.5	28 DAT	13-Sep-12	08-Nov-12	194.4
12-0780-115	12-0419-229	2.5	28 DAT	13-Sep-12	08-Nov-12	242.9
12-0780-121	12-0419-241	2.5	42 DAT	27-Sep-12	08-Nov-12	67.8
12-0780-127	12-0419-253	2.5	42 DAT	27-Sep-12	08-Nov-12	1.20 (0.86)
12-0780-133	12-0419-265	2.5	42 DAT	27-Sep-12	08-Nov-12	36.7
12-0780-139	12-0419-277	2.5	42 DAT	27-Sep-12	08-Nov-12	235.0
12-0780-145	12-0419-289	2.5	42 DAT	27-Sep-12	08-Nov-12	70.1
12-0780-151	12-0419-301	2.5	42 DAT	27-Sep-12	08-Nov-12	90.0
12-0780-157	12-0419-313	2.5	56 DAT	11-Oct-12	08-Nov-12	10.3
12-0780-163	12-0419-325	2.5	56 DAT	11-Oct-12	08-Nov-12	43.2 (35.8)
12-0780-169	12-0419-337	2.5	56 DAT	11-Oct-12	08-Nov-12	132.2
12-0780-175	12-0419-349	2.5	56 DAT	11-Oct-12	08-Nov-12	11.5
12-0780-181	12-0419-361	2.5	56 DAT	11-Oct-12	08-Nov-12	11.6
12-0780-187	12-0419-373	2.5	56 DAT	11-Oct-12	08-Nov-12	4.36

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Note: Results in parentheses are duplicate results.

Table 8 (Continued): Residues of Buparvaquone in Bovine Neck Muscle Following Treatment with BUTALEX

Laboratory Specimen Number	Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
12-0780-315	120419-385	2.5	70 DAT	25-Oct-12	10-Dec-12	57.2
12-0780-316	120419-397	2.5	70 DAT	25-Oct-12	10-Dec-12	29.8 (18.9)
12-0780-317	120419-409	2.5	70 DAT	25-Oct-12	10-Dec-12	36.7
12-0780-318	120419-421	2.5	70 DAT	25-Oct-12	10-Dec-12	38.3
12-0780-319	120419-433	2.5	70 DAT	25-Oct-12	10-Dec-12	30.5
12-0780-320	120419-445	2.5	70 DAT	25-Oct-12	10-Dec-12	25.1
12-0780-321	120419-457	2.5	84 DAT	08-Nov-12	10-Dec-12	1.95
12-0780-322	120419-469	2.5	84 DAT	08-Nov-12	10-Dec-12	65.8
12-0780-323	120419-481	2.5	84 DAT	08-Nov-12	10-Dec-12	30.9
12-0780-324	120419-493	2.5	84 DAT	08-Nov-12	10-Dec-12	9.41
12-0780-325	120419-505	2.5	84 DAT	08-Nov-12	10-Dec-12	8.15 (9.78)
12-0780-326	120419-517	2.5	84 DAT	08-Nov-12	10-Dec-12	78.7
12-0780-255	120419-529	2.5	98 DAT	22-Nov-12	10-Dec-12	72.6
12-0780-256	120419-541	2.5	98 DAT	22-Nov-12	10-Dec-12	62.5
12-0780-257	120419-553	2.5	98 DAT	22-Nov-12	10-Dec-12	3.53 (5.31)
12-0780-258	120419-565	2.5	98 DAT	22-Nov-12	10-Dec-12	0.085
12-0780-259	120419-577	2.5	98 DAT	22-Nov-12	10-Dec-12	0.012
12-0780-260	120419-589	2.5	98 DAT	22-Nov-12	10-Dec-12	14.9
12-0780-363	12-0419-601	2.5	119 DAT	13-Dec-12	11-Jan-13	0.031
12-0780-364	12-0419-613	2.5	119 DAT	13-Dec-12	14-Jan-13	12.8
12-0780-365	12-0419-625	2.5	119 DAT	13-Dec-12	14-Jan-13	29.5
12-0780-366	12-0419-637	2.5	119 DAT	13-Dec-12	14-Jan-13	60.5
12-0780-367	12-0419-649	2.5	119 DAT	13-Dec-12	14-Jan-13	41.1
12-0780-368	12-0419-661	2.5	119 DAT	13-Dec-12	14-Jan-13	9.83
12-0780-399	12-0419-673	2.5	147 DAT	10-Jan-13	04-Feb-13	5.68
12-0780-400	12-0419-685	2.5	147 DAT	10-Jan-13	04-Feb-13	67.7
12-0780-401	12-0419-697	2.5	147 DAT	10-Jan-13	04-Feb-13	9.12
12-0780-402	12-0419-709	2.5	147 DAT	10-Jan-13	04-Feb-13	101.1
12-0780-403	12-0419-721	2.5	147 DAT	10-Jan-13	04-Feb-13	2.79
12-0780-404	12-0419-733	2.5	147 DAT	10-Jan-13	04-Feb-13	18.6

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Note: Results in parentheses are duplicate results.

7.2.5 Table 9: Residues of Buparvaquone in Bovine Back Fat Following Treatment with BUTALEX

Laboratory Specimen Number	Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
12-0780-02	12-0419-2	2.5	-80 DAT	28-May-12	31-Oct-12	<LOD
12-0780-08	12-0419-14	2.5	6 DAT	22-Aug-12	31-Oct-12	<LOD
12-0780-14	12-0419-26	2.5	7 DAT	23-Aug-12	31-Oct-12	0.13
12-0780-20	12-0419-38	2.5	7 DAT	23-Aug-12	31-Oct-12	0.12
12-0780-26	12-0419-50	2.5	7 DAT	23-Aug-12	31-Oct-12	0.099
12-0780-32	12-0419-62	2.5	7 DAT	23-Aug-12	31-Oct-12	0.15
12-0780-38	12-0419-74	2.5	7 DAT	23-Aug-12	31-Oct-12	0.091
12-0780-44	12-0419-86	2.5	7 DAT	23-Aug-12	31-Oct-12	0.11
12-0780-50	12-0419-98	2.5	14 DAT	30-Aug-12	31-Oct-12	0.088
12-0780-56	12-0419-110	2.5	14 DAT	30-Aug-12	31-Oct-12	0.050
12-0780-62	12-0419-122	2.5	14 DAT	30-Aug-12	31-Oct-12	0.068
12-0780-68	12-0419-134	2.5	14 DAT	30-Aug-12	31-Oct-12	0.10
12-0780-74	12-0419-146	2.5	14 DAT	30-Aug-12	31-Oct-12	0.079
12-0780-80	12-0419-158	2.5	14 DAT	30-Aug-12	31-Oct-12	0.087
12-0780-86	12-0419-170	2.5	28 DAT	13-Sep-12	31-Oct-12	0.041
12-0780-92	12-0419-182	2.5	28 DAT	13-Sep-12	31-Oct-12	0.050
12-0780-98	12-0419-194	2.5	28 DAT	13-Sep-12	31-Oct-12	0.006*
12-0780-104	12-0419-206	2.5	28 DAT	13-Sep-12	31-Oct-12	0.045
12-0780-110	12-0419-218	2.5	28 DAT	13-Sep-12	31-Oct-12	0.055
12-0780-116	12-0419-230	2.5	28 DAT	13-Sep-12	31-Oct-12	0.044
12-0780-122	12-0419-242	2.5	42 DAT	27-Sep-12	31-Oct-12	0.026
12-0780-128	12-0419-254	2.5	42 DAT	27-Sep-12	31-Oct-12	0.011
12-0780-134	12-0419-266	2.5	42 DAT	27-Sep-12	31-Oct-12	0.012
12-0780-140	12-0419-278	2.5	42 DAT	27-Sep-12	31-Oct-12	0.059
12-0780-146	12-0419-290	2.5	42 DAT	27-Sep-12	31-Oct-12	0.015
12-0780-152	12-0419-302	2.5	42 DAT	27-Sep-12	31-Oct-12	0.016
12-0780-158	12-0419-314	2.5	56 DAT	11-Oct-12	31-Oct-12	<LOD
12-0780-164	12-0419-326	2.5	56 DAT	11-Oct-12	31-Oct-12	0.013
12-0780-170	12-0419-338	2.5	56 DAT	11-Oct-12	31-Oct-12	0.022
12-0780-176	12-0419-350	2.5	56 DAT	11-Oct-12	31-Oct-12	0.018
12-0780-182	12-0419-362	2.5	56 DAT	11-Oct-12	31-Oct-12	0.017
12-0780-188	12-0419-374	2.5	56 DAT	11-Oct-12	31-Oct-12	<LOD

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Note: Results marked with * are between LOD and LOQ, as the reported values are less than the LOQ, by definition, their accuracy and precision cannot be verified.

Table 9 (Continued): Residues of Buparvaquone in Bovine Back Fat Following Treatment with BUTALEX

Laboratory Specimen Number	Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
12-0780-267	120419-386	2.5	70 DAT	25-Oct-12	03-Dec-12	0.012
12-0780-268	120419-398	2.5	70 DAT	25-Oct-12	03-Dec-12	0.006*
12-0780-269	120419-410	2.5	70 DAT	25-Oct-12	03-Dec-12	0.014
12-0780-270	120419-422	2.5	70 DAT	25-Oct-12	03-Dec-12	0.008*
12-0780-271	120419-434	2.5	70 DAT	25-Oct-12	03-Dec-12	0.015
12-0780-272	120419-446	2.5	70 DAT	25-Oct-12	03-Dec-12	0.016
12-0780-273	120419-458	2.5	84 DAT	08-Nov-12	03-Dec-12	0.008*
12-0780-274	120419-470	2.5	84 DAT	08-Nov-12	03-Dec-12	0.017
12-0780-275	120419-482	2.5	84 DAT	08-Nov-12	03-Dec-12	0.007*
12-0780-276	120419-494	2.5	84 DAT	08-Nov-12	03-Dec-12	0.016
12-0780-277	120419-506	2.5	84 DAT	08-Nov-12	03-Dec-12	0.012
12-0780-278	120419-518	2.5	84 DAT	08-Nov-12	03-Dec-12	0.015
12-0780-231	120419-530	2.5	98 DAT	22-Nov-12	03-Dec-12	0.010
12-0780-232	120419-542	2.5	98 DAT	22-Nov-12	03-Dec-12	0.006*
12-0780-233	120419-554	2.5	98 DAT	22-Nov-12	03-Dec-12	<LOD
12-0780-234	120419-566	2.5	98 DAT	22-Nov-12	03-Dec-12	<LOD
12-0780-235	120419-578	2.5	98 DAT	22-Nov-12	03-Dec-12	<LOD
12-0780-236	120419-590	2.5	98 DAT	22-Nov-12	03-Dec-12	0.011
12-0780-339	12-0419-602	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0780-340	12-0419-614	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0780-341	12-0419-626	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0780-342	12-0419-638	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0780-343	12-0419-650	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0780-344	12-0419-662	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0780-375	12-0419-674	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD
12-0780-376	12-0419-686	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD
12-0780-377	12-0419-698	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD
12-0780-378	12-0419-710	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD
12-0780-379	12-0419-722	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD
12-0780-380	12-0419-734	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Note: Results marked with * are between LOD and LOQ, as the reported values are less than the LOQ, by definition, their accuracy and precision cannot be verified.

7.2.6 Table 10: Residues of Buparvaquone in Bovine Peri-renal Fat Following Treatment with BUTALEX

Laboratory Specimen Number	Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
12-0780-05	12-0419-05	2.5	-80 DAT	28-May-12	01-Nov-12	<LOD
12-0780-11	12-0419-17	2.5	6 DAT	22-Aug-12	01-Nov-12	<LOD
12-0780-17	12-0419-29	2.5	7 DAT	23-Aug-12	01-Nov-12	0.11
12-0780-23	12-0419-41	2.5	7 DAT	23-Aug-12	01-Nov-12	0.12
12-0780-29	12-0419-53	2.5	7 DAT	23-Aug-12	01-Nov-12	0.15
12-0780-35	12-0419-65	2.5	7 DAT	23-Aug-12	01-Nov-12	0.16
12-0780-41	12-0419-77	2.5	7 DAT	23-Aug-12	01-Nov-12	0.11
12-0780-47	12-0419-89	2.5	7 DAT	23-Aug-12	01-Nov-12	0.085
12-0780-53	12-0419-101	2.5	14 DAT	30-Aug-12	01-Nov-12	0.054
12-0780-59	12-0419-113	2.5	14 DAT	30-Aug-12	01-Nov-12	0.063
12-0780-65	12-0419-125	2.5	14 DAT	30-Aug-12	01-Nov-12	0.090
12-0780-71	12-0419-137	2.5	14 DAT	30-Aug-12	01-Nov-12	0.097
12-0780-77	12-0419-149	2.5	14 DAT	30-Aug-12	01-Nov-12	0.094
12-0780-83	12-0419-161	2.5	14 DAT	30-Aug-12	01-Nov-12	0.090
12-0780-89	12-0419-173	2.5	28 DAT	13-Sep-12	01-Nov-12	0.047
12-0780-95	12-0419-185	2.5	28 DAT	13-Sep-12	01-Nov-12	0.049
12-0780-101	12-0419-197	2.5	28 DAT	13-Sep-12	01-Nov-12	0.005*
12-0780-107	12-0419-209	2.5	28 DAT	13-Sep-12	01-Nov-12	0.045
12-0780-113	12-0419-221	2.5	28 DAT	13-Sep-12	01-Nov-12	0.050
12-0780-119	12-0419-233	2.5	28 DAT	13-Sep-12	01-Nov-12	0.044
12-0780-125	12-0419-245	2.5	42 DAT	27-Sep-12	01-Nov-12	0.028
12-0780-131	12-0419-257	2.5	42 DAT	27-Sep-12	01-Nov-12	0.011
12-0780-137	12-0419-269	2.5	42 DAT	27-Sep-12	01-Nov-12	0.018
12-0780-143	12-0419-281	2.5	42 DAT	27-Sep-12	01-Nov-12	0.061
12-0780-149	12-0419-293	2.5	42 DAT	27-Sep-12	01-Nov-12	0.019
12-0780-155	12-0419-305	2.5	42 DAT	27-Sep-12	01-Nov-12	0.020
12-0780-161	12-0419-317	2.5	56 DAT	11-Oct-12	01-Nov-12	<LOD
12-0780-167	12-0419-329	2.5	56 DAT	11-Oct-12	01-Nov-12	0.008*
12-0780-173	12-0419-341	2.5	56 DAT	11-Oct-12	01-Nov-12	0.017
12-0780-179	12-0419-353	2.5	56 DAT	11-Oct-12	01-Nov-12	0.008*
12-0780-185	12-0419-365	2.5	56 DAT	11-Oct-12	01-Nov-12	0.009*
12-0780-191	12-0419-377	2.5	56 DAT	11-Oct-12	01-Nov-12	<LOD

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Note: Results marked with * are between LOD and LOQ, as the reported values are less than the LOQ, by definition, their accuracy and precision cannot be verified.

Table 10 (Continued): Residues of Buparvaquone in Bovine Peri-renal Fat Following Treatment with BUTALEX

Laboratory Specimen Number	Client Reference	Treatment (mg/kg)	Days After Treatment	Date Sampled	Date of Analysis	Buparvaquone (mg/kg)
12-0780-327	120419-389	2.5	70 DAT	25-Oct-12	03-Dec-12	<LOD
12-0780-328	120419-401	2.5	70 DAT	25-Oct-12	03-Dec-12	<LOD
12-0780-329	120419-413	2.5	70 DAT	25-Oct-12	03-Dec-12	0.007*
12-0780-330	120419-425	2.5	70 DAT	25-Oct-12	03-Dec-12	<LOD
12-0780-331	120419-437	2.5	70 DAT	25-Oct-12	03-Dec-12	0.007*
12-0780-332	120419-449	2.5	70 DAT	25-Oct-12	03-Dec-12	0.006*
12-0780-333	120419-461	2.5	84 DAT	08-Nov-12	03-Dec-12	<LOD
12-0780-334	120419-473	2.5	84 DAT	08-Nov-12	03-Dec-12	0.006*
12-0780-335	120419-485	2.5	84 DAT	08-Nov-12	03-Dec-12	<LOD
12-0780-336	120419-497	2.5	84 DAT	08-Nov-12	03-Dec-12	0.007*
12-0780-337	120419-509	2.5	84 DAT	08-Nov-12	03-Dec-12	0.006*
12-0780-338	120419-521	2.5	84 DAT	08-Nov-12	03-Dec-12	<LOD
12-0780-261	120419-533	2.5	98 DAT	22-Nov-12	03-Dec-12	0.007*
12-0780-262	120419-545	2.5	98 DAT	22-Nov-12	03-Dec-12	<LOD
12-0780-263	120419-557	2.5	98 DAT	22-Nov-12	03-Dec-12	<LOD
12-0780-264	120419-569	2.5	98 DAT	22-Nov-12	03-Dec-12	<LOD
12-0780-265	120419-581	2.5	98 DAT	22-Nov-12	03-Dec-12	<LOD
12-0780-266	120419-593	2.5	98 DAT	22-Nov-12	03-Dec-12	0.005*
12-0780-369	12-0419-605	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0780-370	12-0419-617	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0780-371	12-0419-629	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0780-372	12-0419-641	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0780-373	12-0419-653	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0780-374	12-0419-665	2.5	119 DAT	13-Dec-12	08-Jan-13	<LOD
12-0780-405	12-0419-677	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD
12-0780-406	12-0419-689	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD
12-0780-407	12-0419-701	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD
12-0780-408	12-0419-713	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD
12-0780-409	12-0419-725	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD
12-0780-410	12-0419-737	2.5	147 DAT	10-Jan-13	22-Jan-13	<LOD

LOD = Limit of Detection = 0.005 mg/kg.
LOQ = Limit of Quantitation = 0.01 mg/kg.
UTC = Untreated Control
DAT = Days after treatment
Treatment = mg/kg of bodyweight

Note: Results marked with * are between LOD and LOQ, as the reported values are less than the LOQ, by definition, their accuracy and precision cannot be verified.

7.3 Tables of Long-Term Freezer Storage* Stability Data

7.3.1 Table 11: Residues of Buparvaquone in Long-Term* Freezer Stability Tissue Samples

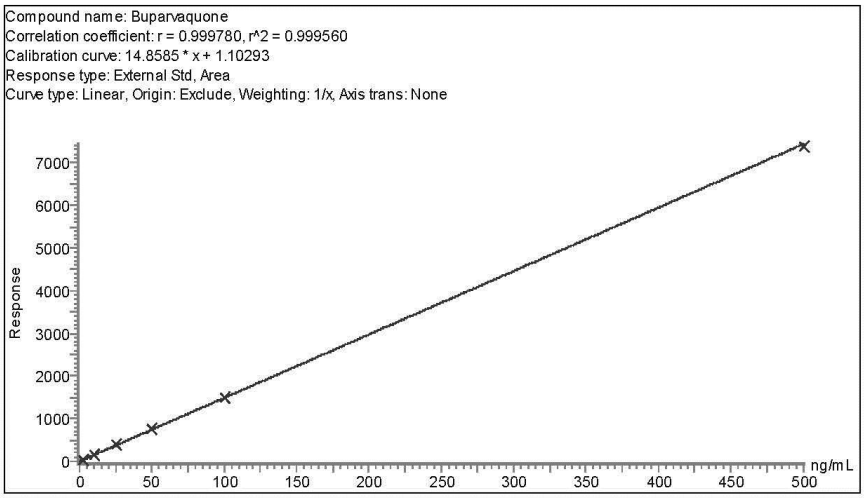
Laboratory No.	Substrate	Fortified Level (mg/kg)	Buparvaquone (mg/kg)	Recovery (%)	Mean Recovery# (%)	Sample Type
12-0780-204	Liver	0.01001	0.00817	82	89	Stored for 87 days
12-0780-205	Liver	0.01001	0.00996	100		
12-0780-206	Liver	0.01001	0.00862	86		
12-0780-207	Liver	0.1001	0.07715	77	81	Stored for 87 days
12-0780-208	Liver	0.1001	0.08137	81		
12-0780-209	Liver	0.1001	0.08397	84		
12-0780-04R15	Liver	0.01001	0.01014	101	-	Freshly prepared
12-0780-211	Kidney	0.01001	0.01022	102	104	Stored for 86 days
12-0780-212	Kidney	0.01001	0.01001	100		
12-0780-213	Kidney	0.01001	0.01092	109		
12-0780-214	Kidney	0.1001	0.1016	102	101	Stored for 86 days
12-0780-215	Kidney	0.1001	0.09965	100		
12-0780-216	Kidney	0.1001	0.1030	103		
12-0780-06R14	Kidney	0.01001	0.00912	91	-	Freshly prepared
12-0780-218	Muscle	0.01001	0.01015	101	95	Stored for 86 days
12-0780-219	Muscle	0.01001	0.00962	96		
12-0780-220	Muscle	0.01001	0.00879	88		
12-0780-221	Muscle	0.1001	0.09859	99	96	Stored for 86 days
12-0780-222	Muscle	0.1001	0.09376	94		
12-0780-223	Muscle	0.1001	0.09674	97		
12-0780-03R9	Muscle	0.01001	0.01071	107	-	Freshly prepared
12-0780-225	Fat	0.01001	0.00755	75	78	Stored for 84 days
12-0780-226	Fat	0.01001	0.00704	70		
12-0780-227	Fat	0.01001	0.00897	90		
12-0780-228	Fat	0.1001	0.09578	96	96	Stored for 84 days
12-0780-229	Fat	0.1001	0.09372	94		
12-0780-230	Fat	0.1001	0.09778	98		
12-0780-11R9	Fat	0.01001	0.00835	83	-	Freshly prepared

***Note**: Tissue samples stored for 84-87days at approximately -20°C.

#Note: Amount of analyte remaining after storage period

8 FIGURES

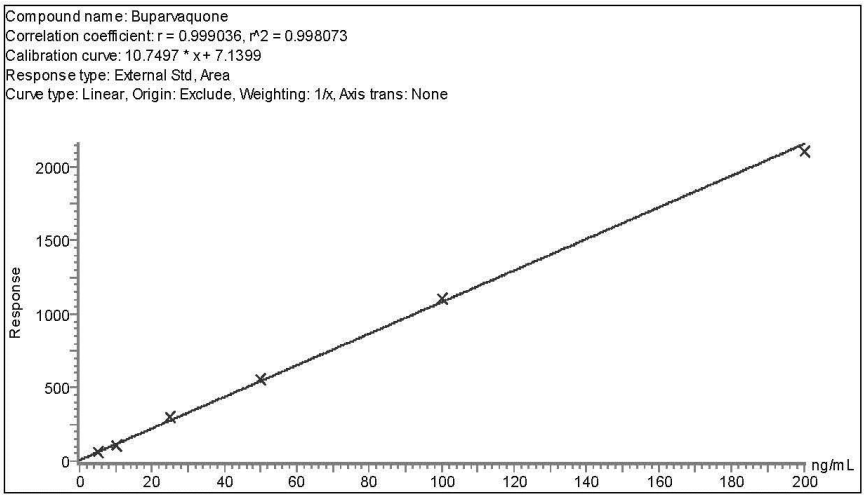
8.1 Figure 1: Typical Calibration Curve for Buparvaquone Liver Recovery Standards



Buparvaquone Concentration (µg/kg)	Peak Area	Calculated Concentration (µg/kg)
2.50	32	2.10
10.0	161	10.8
25.0	393	26.4
50.0	767	51.5
100.1	1501	101
500.4	7476	496.3

Method Equivalent Concentration:
10 µg/kg buparvaquone in solution = 0.01 mg/kg buparvaquone in bovine liver (MF = 1)

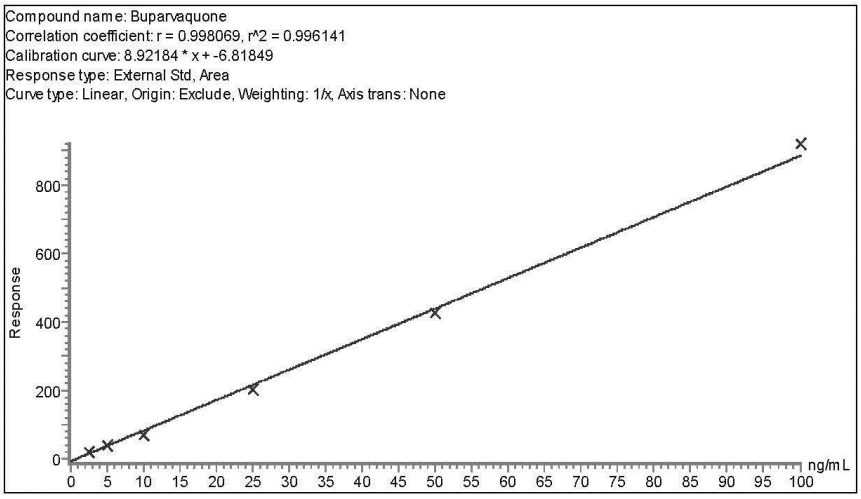
8.2 Figure 2: Typical Calibration Curve for Buparvaquone Kidney Recovery Standards



Buparvaquone Concentration (µg/kg)	Peak Area	Calculated Concentration (µg/kg)
5.00	60	4.87
10.0	104	9.02
25.0	304	27.6
50.0	558	51.2
100.1	1107	102.4
200.2	2106	195.2

Method Equivalent Concentration:
10 µg/kg buparvaquone in solution = 0.01 mg/kg buparvaquone in bovine kidney (MF = 1)

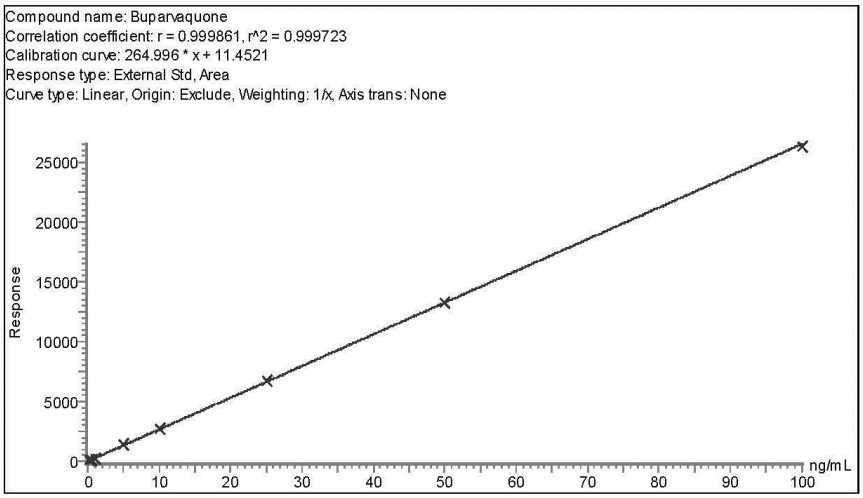
8.3 Figure 3: Typical Calibration Curve for Buparvaquone Muscle Recovery Standards



Buparvaquone Concentration (µg/kg)	Peak Area	Calculated Concentration (µg/kg)
2.50	19	2.87
5.00	40	5.25
10.0	69	8.54
25.0	204	23.6
50.0	425	48.4
100.1	921	104.0

Method Equivalent Concentration:
10 µg/kg buparvaquone in solution = 0.01 mg/kg buparvaquone in bovine muscle and neck muscle (MF = 1)

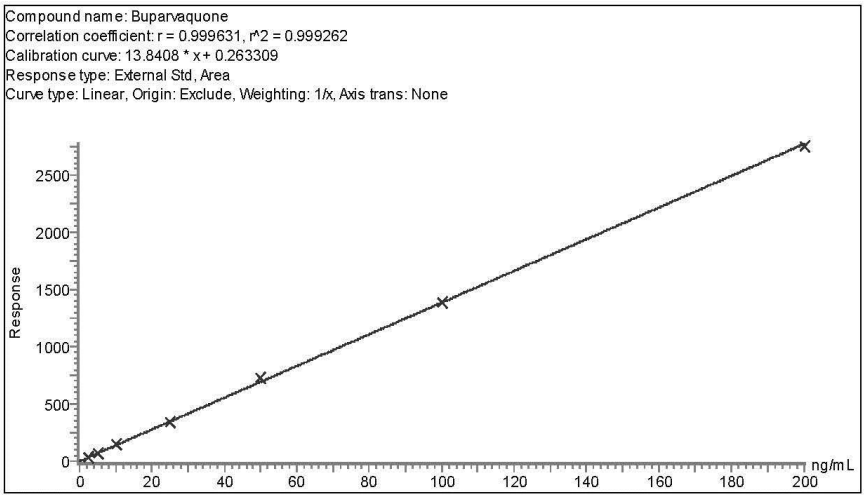
8.4 Figure 4: Typical Calibration Curve for Buparvaquone Neat Standards



Buparvaquone Concentration (µg/L)	Peak Area	Calculated Concentration (µg/L)
0.25	68	0.21
0.50	163	0.57
1.00	260	0.94
5.00	1365	5.11
10.0	2766	10.4
25.0	6763	25.5
50.0	13238	49.9
100.1	26322	99.3

Method Equivalent Concentration:
1 µg/L Buparvaquone in solution = 6.25 mg/kg Buparvaquone in bovine neck muscle (MF = 6250)

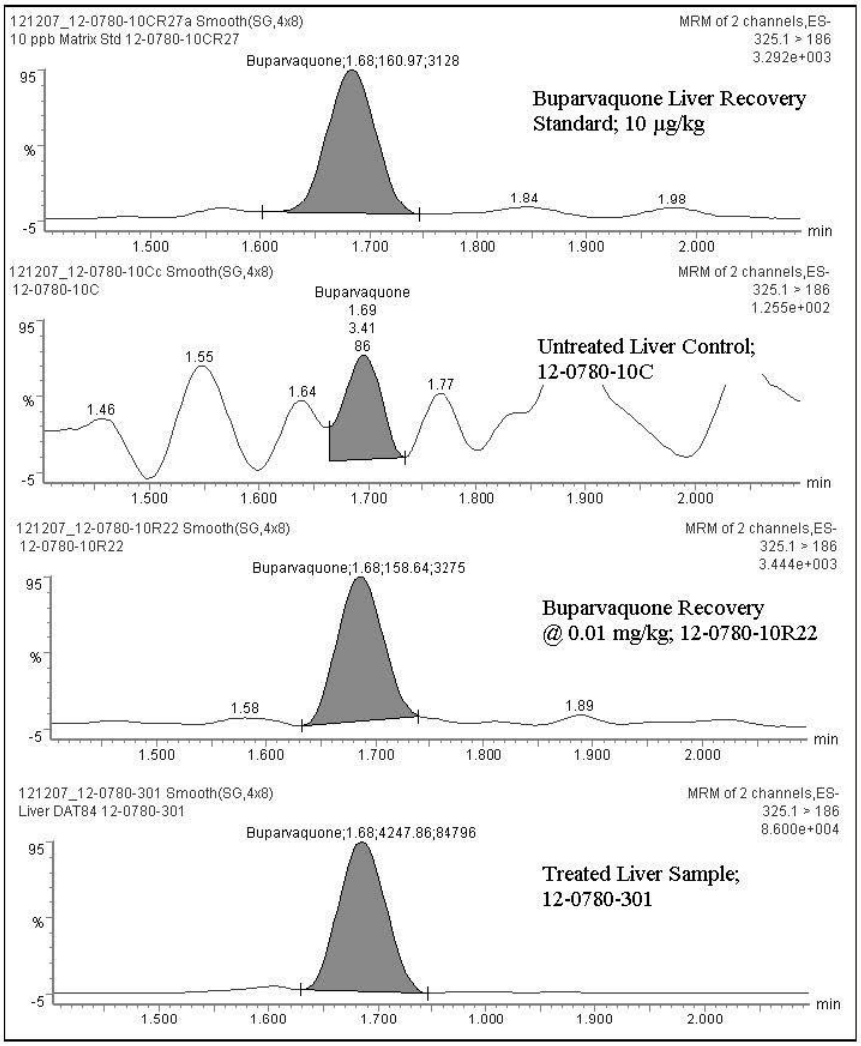
8.5 Figure 5: Typical Calibration Curve for Buparvaquone Fat Recovery Standards



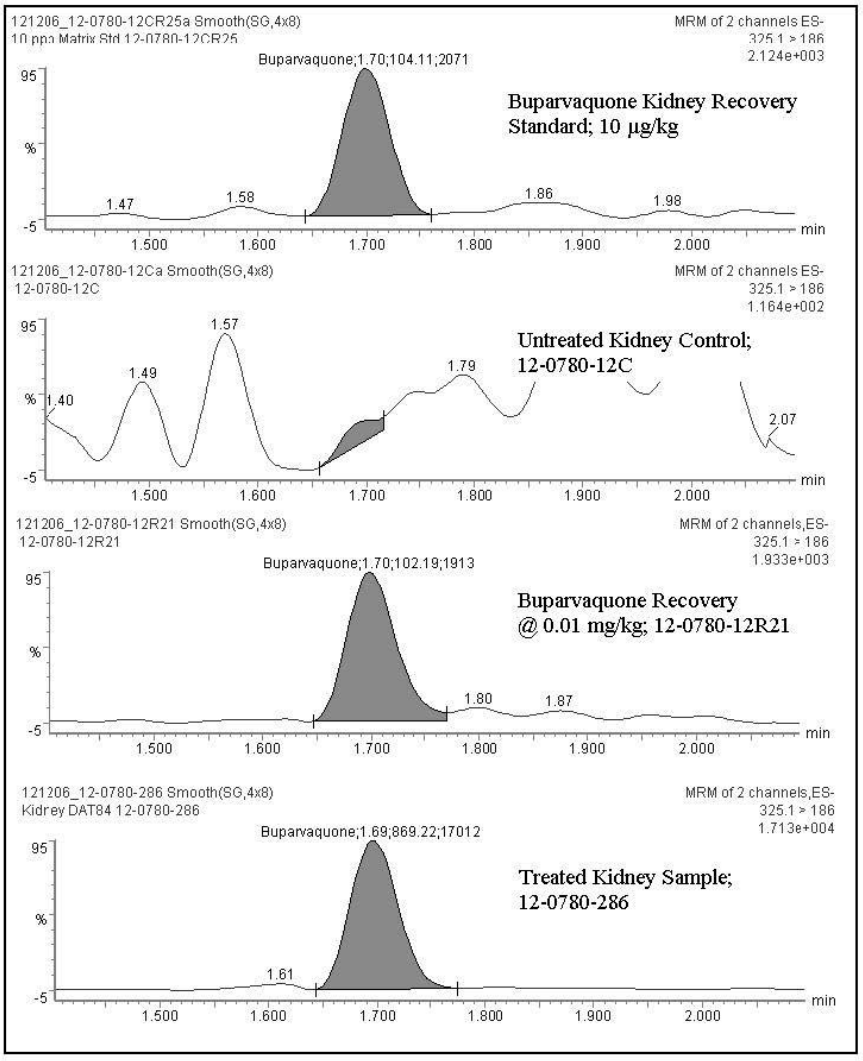
Buparvaquone Concentration (µg/kg)	Peak Area	Calculated Concentration (µg/kg)
2.50	34	2.44
5.00	65	4.70
10.0	149	10.8
25.0	337	24.3
50.0	728	52.5
100.1	1382	99.8
200.2	2744	198.2

Method Equivalent Concentration:
10 µg/kg buparvaquone in solution = 0.01 mg/kg buparvaquone in bovine fat (MF = 1)

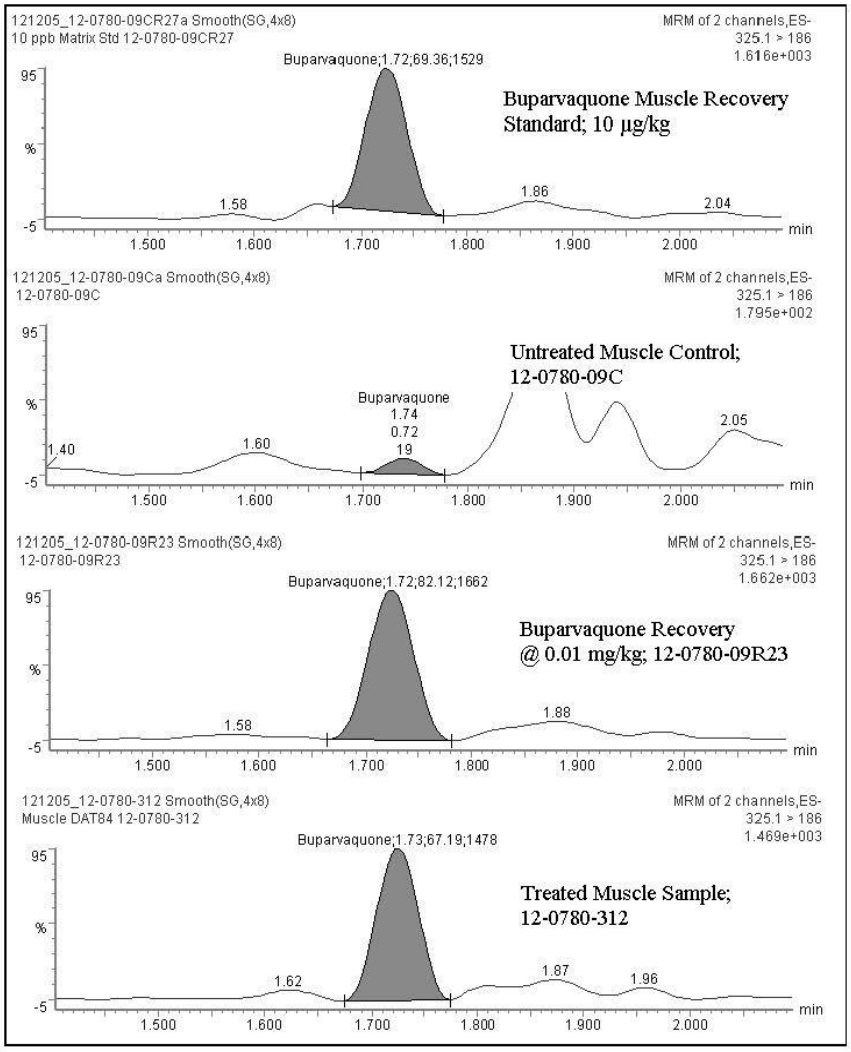
8.6 Figure 6: Typical Chromatograms for Buparvaquone in Bovine Liver



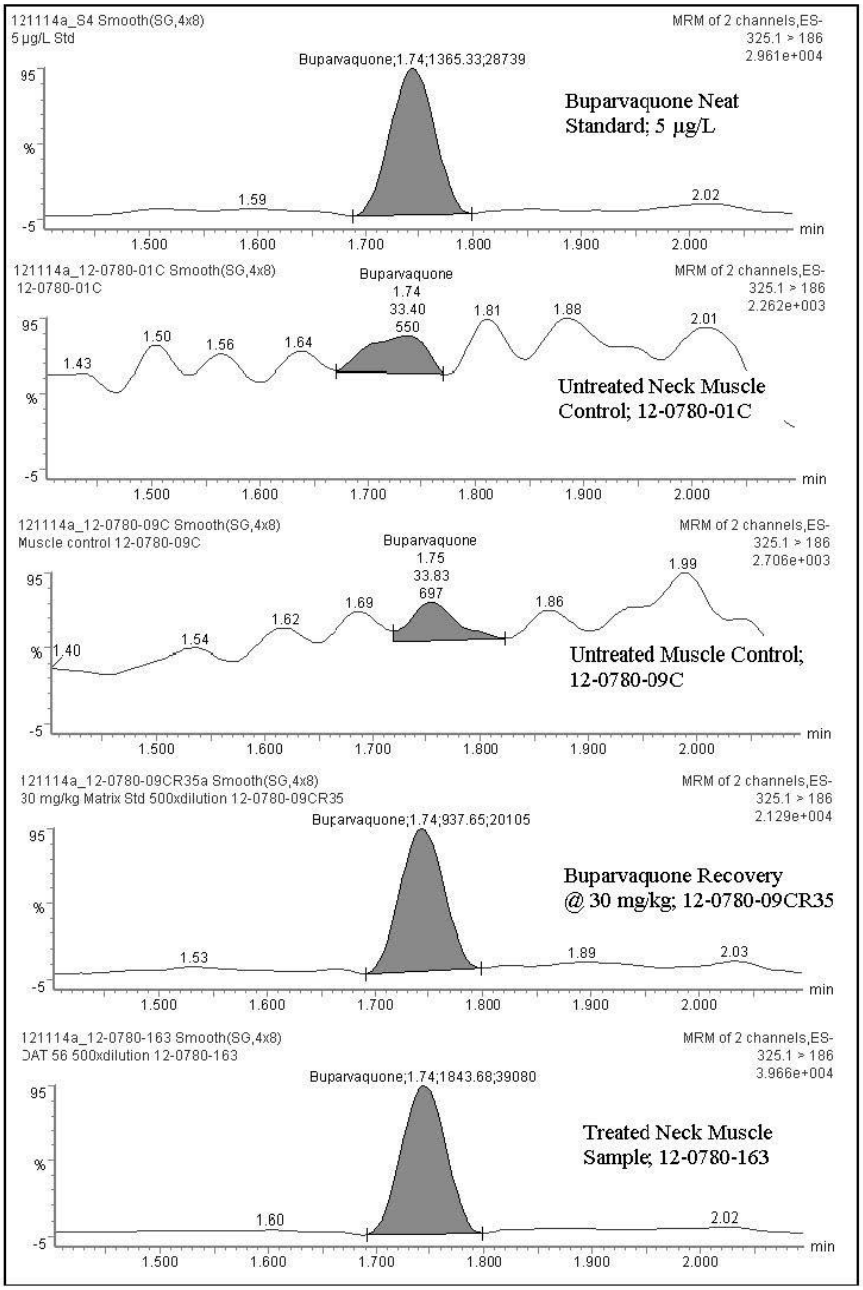
8.7 Figure 7: Typical Chromatograms for Buparvaquone in Bovine Kidney



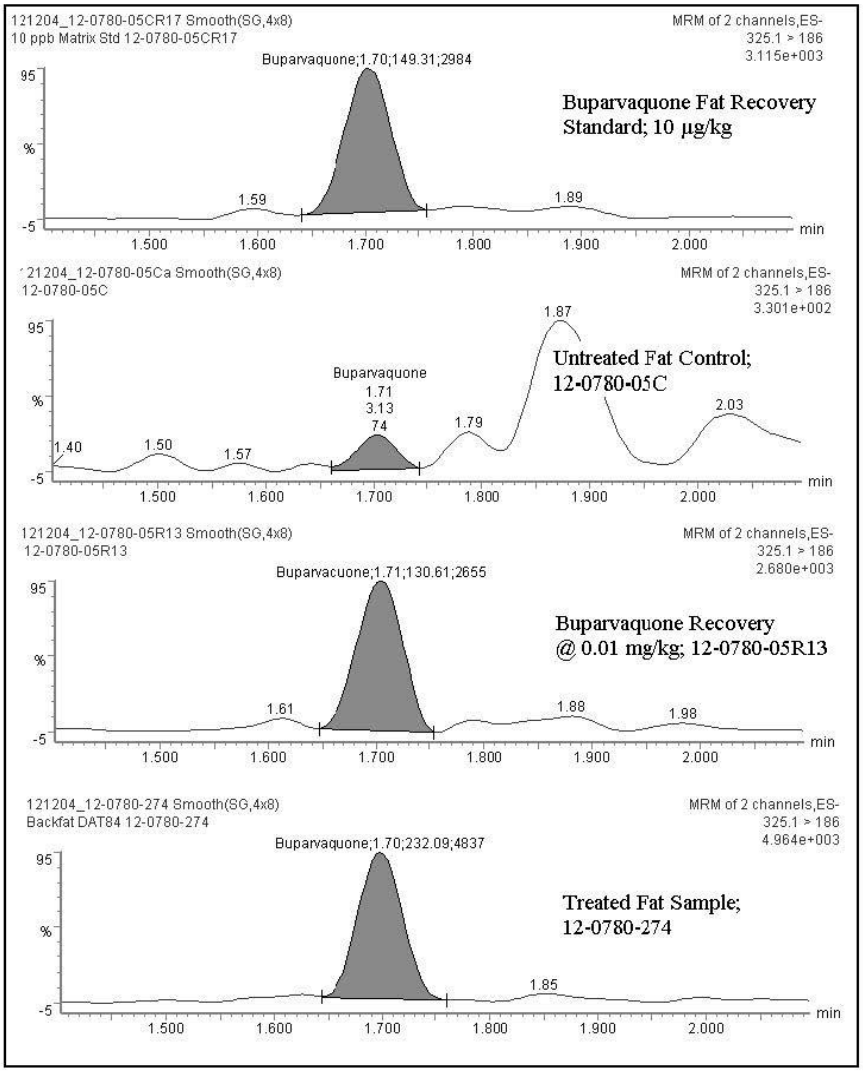
8.8 Figure 8: Typical Chromatograms for Buparvaquone in Bovine Muscle



8.9 Figure 9: Typical Chromatograms for Buparvaquone in Bovine Neck Muscle



8.10 Figure 10: Typical Chromatograms for Buparvaquone in Bovine Fat



9 APPENDICES

9.1 Appendix 1: Certificates of Analysis

Certificate of Analysis – Buparvaquone Standard

Vet Pharma Friesoythe GmbH

Certificate of Analysis
Reference Standard(Material): ***Buparvaquone***

Standrad Number:	Potency
S 789	100.17 % as is

TEST	ACCEPTANCE CRITERIA	RESULT
Description:	A pale greenish-yellow to brownish-yellow powder	Complies
Identification:	Complies	Complies
Infrared spectrum		
Assay: cis-Isomer	≤ 0.10 %	< 0.1 %
Unidentified Related substances (TLC)	Each unknown ≤ 0.2 %	< 0.2 %
	Total unknown ≤ 1.0 %	< 1.00 %
Residual Solvents	Toluene: max. 0.5 % (w/w)	0.04 %
Heavy Metals	≤ 20 ppm	Complies
Sulphated ash	≤ 0.2 %	< 0.2 %
Assay Buparvaquone	99.0 – 101.0 % as is	100.17 %

Date of Re-Certification:	October 25, 2012
Date to be Re-certified:	October, 2015
Previous Reference Material:	S 702
Storage:	Room temperature
Handling:	./.
Shipping:	Keep container tightly closed. Protect from moisture and light.

Prepared by: S. Schoone, Quality Service Date: 25. OKT. 2012

Approved by: G. Schulte, Head of Quality Service Date: 29. OKT. 2012

S 789: page 1 of 1

9.2 Appendix 2: Glossary of Terms and Abbreviations

APVMA	Australian Pesticides and Veterinary Medicines Authority
GLP	Good Laboratory Practice
NATA	National Association of Testing Authorities, Australia
OECD	The Organisation for Economic Co-operation and Development
MRL	Maximum Residue Limit
kg	Kilogram
g	Gram
mg	Milligram
µg	Microgram
mL	Millilitre
µL	Microlitre
mg/kg	Milligrams per Kilogram
µg/kg	Micrograms per Kilogram
mm	Millimetre
µm	Micrometre
v/v	concentration in volume/volume
r^2	Coefficient of Determination
HPLC/MS/MS	High Performance Liquid Chromatography tandem Mass Spectrometry
MRM	Multiple Reaction Monitoring
LOD	Limit of Detection
LOQ	Limit of Quantitation
RSD	Relative Standard Deviation
σ	Standard Deviation
MF	Method Factor