Biomonitor

Steuben County Lakes Council
317 South Wayne Street,
Suite 2A
Angola, IN 46703

STEUBEN COUNTY SOURCE TRACKING

INTRODUCTION

In October 2020, 15 samples from 16 different sites were collected near Steuben County to ascertain the source of elevated *Escherichia coli* concentrations at several locations in Steuben County. The samples were collected after a rain event, however, dry conditions for several weeks prior to sampling lead to lower flow at many of the sampling locations. Palfreyman Ditch (sites 12-16) and Carpenter Creek (sites 7-10) flow into Crooked Lake west of Angola. Black Creek (Sites 1 and 2) flows into Hamilton Lake near Hamilton. Sites 4, 5, and 6 all flow into Lake George. Previous sampling and analysis had determined that these streams frequently have high concentrations of *E. co*li that exceed limits for safe swimming. The monitoring sites are shown in Table 1 and Figures 1, 2 and 3. These samples were analyzed for *E. coli* and the presence of human, swine, bovine, poultry, dog, and Canadian goose DNA. Special attention was paid to a housing development called Northwood located along Palfreyman Ditch. This development is not connected to the city sanitary sewer and elevated *E. coli* levels have been found in the area.

| Site Number | Latitude | Longitude | Water Body | Description |
|---|---|---|---|---|
| 1 | 41.5673679 | -84.8751877 | Black Creek | CR 600 E |
| 2 | 41.5738499 | -84.8850472 | Black Creek | CR 550 E |
| 3 | 41.7293825 | -84.8243669 | Clear Lake | Boat Ramp |
| 4 | 41.7685738 | -85.0201903 | Lake George | Flint Road Boat Ramp |
| 5 | 41.7761683 | -85.0019888 | Lake George | Angola Road |
| 6 | 41.7713339 | -85.004431 | Lake George | Kope Kon Road |
| 7 | 41.6555037 | -85.0195794 | Carpenter Creek | CR 155 W |
| 8 | 41.6568634 | -85.0230525 | Carpenter Creek | CR 100 N |
| 9 | 41.6607941 | -85.0282594 | Carpenter Creek | CR 200 W |
| 10 | 41.6670917 | -85.0362151 | Carpenter Creek | Beach Road |
| 11 | 41.6681564 | -85.0360016 | Crooked Lake | Beach |
| 12 | 41.6713764 | -85.0263185 | Palfreyman Ditch | CR 200 W |
| 13 | 41.6644794 | -85.0182336 | Palfreyman Ditch | Downstream Northwood |
| 14 | 41.6641362 | -85.0181106 | Palfreyman Ditch | Northwood |
| 15 | 41.6643306 | -85.0173968 | Palfreyman Ditch | Upstream Northwood |

| Site Number | Latitude | Longitude | Water Body | Description |
|---|---|---|---|---|
| 16 | 41.6588809 | -85.0041896 | Palfreyman Ditch | Wohlert |

Table 1: October 22, 2020 Sampling Locations

Figure 1: Sampling Locations Overview

Figure 2: Carpenter Creek, Crooked Lake, and Palfreyman Ditch sampling locations

Figure 3: Lake George sampling locations

RESULTS

The unnamed ditch which flows out of the Northwood subdivision and into Palfreyman ditch was dry, therefore sample 14 could not be collected. *E. coli* samples were tested by Astbury Water Group in Angola, IN to stay within the short holding time for bacterial samples. The complete report can be found in Appendix 1. Elevated *E. coli* levels were found at many of the sampling locations. Notably, levels were extremely high all along Palfreyman Ditch. A summary of the *E. Coli* results can be found in Table 2.

The samples were also analyzed for human, dog, Canadian goose, bovine, swine, poultry, and sheep DNA. The complete lab report can be found in Appendix 2. No bovine, swine, or sheep DNA was detected at any location, so those items have not been included in the summary figures. A summary of the eDNA results can be found in Table 3. Filtered volume of sample was included in Table 3, although this value has been normalized in the eDNA results, it is useful to consider the overall turbidity of the creek or ditch. A graph showing eDNA results plotted alongside *E. coli* results can be seen in Figure 4.

| Site Number | Water Body | Description | Estimated Velocity | *E. Coli (MPN/100 mL)* | |
|---|---|---|---|---|---|
| 1 | Black Creek | CR 600 E | 0.1 cfs | | 2420 |
| 2 | Black Creek | CR 550 E | 0.2 cfs | | 1414 |
| 3 | Clear Lake | Boat Ramp | 0.01 cfs | | 816 |
| 4 | Lake George | Flint Road Boat Ramp | 0.2 cfs | > | 2419.6 |
| 5 | Lake George | Angola Road | 0.5 cfs | | 28 |
| 6 | Lake George | Kope Kon Road | 0.8 cfs | | 178 |
| 7 | Carpenter Creek | CR 155 W | 0.1 cfs | | 184 |
| 8 | Carpenter Creek | CR 100 N | 0.2 cfs | | 727 |
| 9 | Carpenter Creek | CR 200 W | 0.4 cfs | | 579 |
| 10 | Carpenter Creek | Beach Road | 0.5 cfs | | 1300 |
| 11 | Crooked Lake | Beach | NA | | 4 |
| 12 | Palfreyman Ditch | CR 200 W | 4 cfs | > | 2419.6 |
| 13 | Palfreyman Ditch | Downstream Northwood | 3 cfs | > | 2419.6 |
| 14 | Palfreyman Ditch | Northwood | Dry | | Dry |
| 15 | Palfreyman Ditch | Upstream Northwood | 3 cfs | > | 2419.6 |
| 16 | Palfreyman Ditch | Wohlert | 2 cfs | > | 2419.6 |

Table 2: *E. Coli* Results Summary

| Site Number | Water Body | Description | eDNA Code | Filtered Volume | Goose | Dog | Human | Poultry |
|---|---|---|---|---|---|---|---|---|
| 1 | Black Creek | CR 600 E | UOV2FTD5 | 25 mL | 0 | 0 | 59 | 32 |
| 2 | Black Creek | CR 550 E | L4ZGQVKB | 60 mL | 0 | 0 | 0 | 0 |
| 3 | Clear Lake | Boat Ramp | 8F6VO298 | 60 mL | 0 | 22 | 0 | 43 |
| 4 | Lake George | Flint Road Boat Ramp | UIHBK49K | 60 mL | 0 | 22 | 1 | 18 |

| Site Number | Water Body | Description | eDNA Code | Filtered Volume | Goose | Dog | Human | Poultry |
|---|---|---|---|---|---|---|---|---|
| 5 | Lake George | Angola Road | 5U7DT1KJ | 320 mL | 17 | 0 | 4 | 0 |
| 6 | Lake George | Kope Kon Road | 7VZPXUE6 | 180 mL | 0 | 0 | 31 | 6 |
| 7 | Carpenter Creek | CR 155 W | XLZ9XXP9 | 180 mL | 0 | 0 | 0 | 0 |
| 8 | Carpenter Creek | CR 100 N | V6H14MOG | 180 mL | 0 | 0 | 5 | 0 |
| 9 | Carpenter Creek | CR 200 W | IO5MY3PF | 180 mL | 0 | 0 | 0 | 0 |
| 10 | Carpenter Creek | Beach Road | P6BWTK6U | 240 mL | 0 | 7 | 18 | 0 |
| 11 | Crooked Lake | Beach | 4688 | 300 mL | 0 | 4 | 33 | 0 |
| 12 | Palfreyman Ditch | CR 200 W | 4731 | 45 mL | 0 | 64 | 0 | 0 |
| 13 | Palfreyman Ditch | Downstream Northwood | 4735 | 60 mL | 0 | 0 | 60 | 0 |
| 14 | Palfreyman Ditch | Northwood | NA | NA | Dry | Dry | Dry | Dry |
| 15 | Palfreyman Ditch | Upstream Northwood | 4801 | 60 mL | 0 | 34 | 144 | 22 |
| 16 | Palfreyman Ditch | Wohlert | 4706 | 60 mL | 0 | 1 | 40 | 0 |

Table 3: eDNA Results Summary

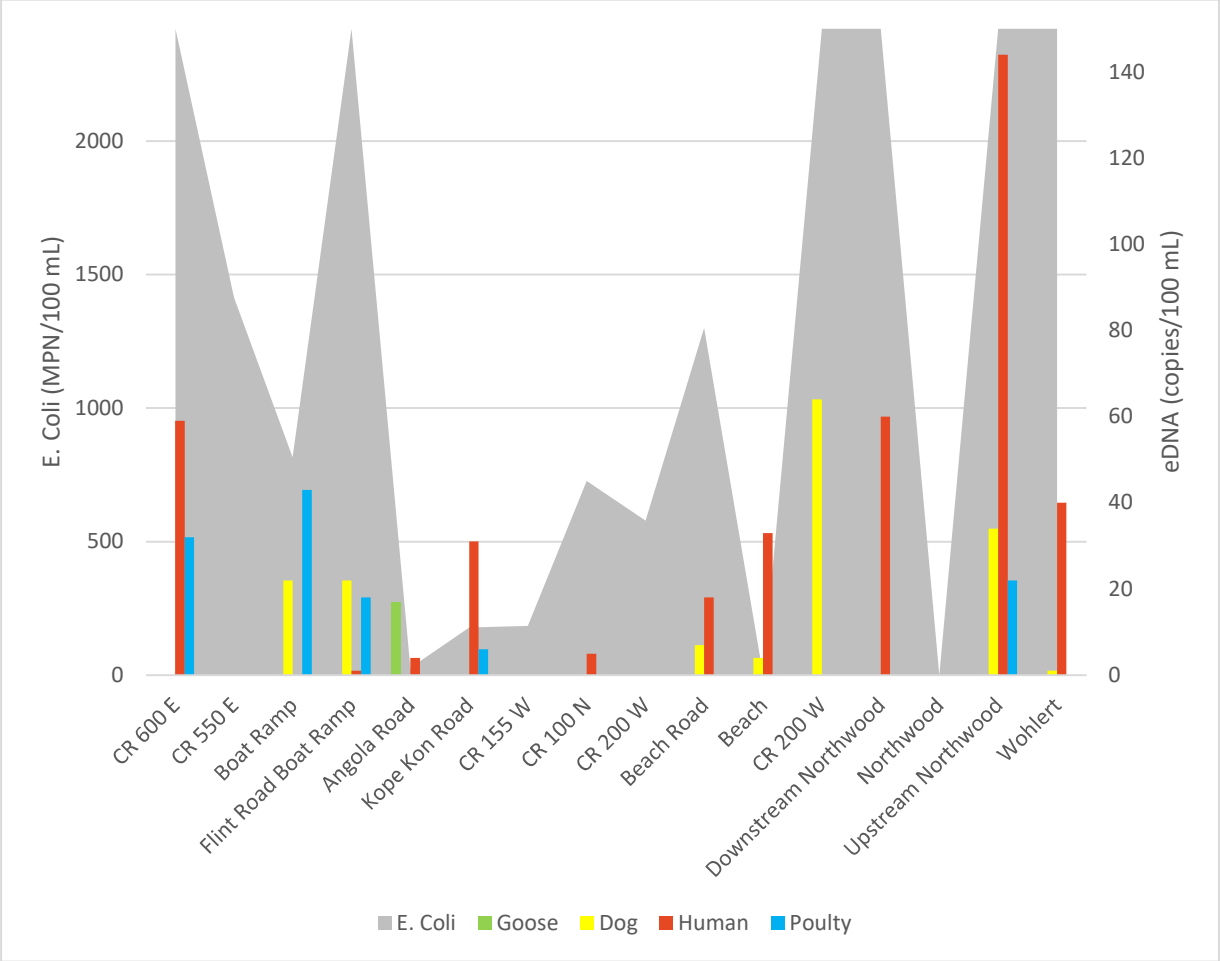


Figure 4: E. Coli and eDNA results

CONCLUSIONS

In general, *E. coli* was detected at high concentrations at many locations throughout the sampling area. Many *E. coli* bacteria are not particularly pathogenic and should only be used as a marker of sewage contamination. Their presence in high numbers should be considered most significant in streams in which human sources are predominant. Many of the streams sampled had elevated levels of human DNA detected. Most notably, at nearly every point along Palfreyman Ditch, elevated human DNA levels were found. Although those levels were especially high in the area of Northwood subdivision, it can't be ignored that human DNA levels, as well as raw E. coli levels were already high much further upstream at sampling site 16.

APPENDIX 1

# - CERTIFICATE OF ANALYSIS -

Disp. Code: E M P

**Report Date:** *04-Nov-20 01:21 PM*

**Client ID:** BIOMONITOR

Biomonitor
8802 W. Washington Street
Indianapolis, Indiana 46231

**Phone:** (317) 297-7713
**Attn:** Michael Britton
**FAX:**

**Our Lab #** 20017352-001
**Your Sample ID:** Sample #1
**Sample Composition:** Grab

**Your Project #**
**Your Project Name:** **Angola @ DNA**
**Sample Type:** Wastewater

**Collection Date:** 10/22/20 10:15
**Collected By:** Client
**Receipt Date:** 10/22/20 16:00

Escherichia coli, Colilert Method

| Analytical Method | Prep Method | Prep Date | By |
|---|---|---|---|
| Colilert | | | |

| Parameter | Result | Units | Qual | Quant. Limit | CAS # | Analysis Date | By |
|---|---|---|---|---|---|---|---|
| Escherichia coli | 2420 | MPN/100 mL | | 1 | | 10/22/20 17:10 | kzaerr |

**Our Lab #** 20017352-002
**Your Sample ID:** Sample #2
**Sample Composition:** Grab

**Your Project #**
**Your Project Name:** **Angola @ DNA**
**Sample Type:** Wastewater

**Collection Date:** 10/22/20 10:45
**Collected By:** Client
**Receipt Date:** 10/22/20 16:00

Escherichia coli, Colilert Method

| Analytical Method | Prep Method | Prep Date | By |
|---|---|---|---|
| Colilert | | | |

| Parameter | Result | Units | Qual | Quant. Limit | CAS # | Analysis Date | By |
|---|---|---|---|---|---|---|---|
| Escherichia coli | 1414 | MPN/100 mL | | 1 | | 10/22/20 17:10 | kzaerr |



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**Our Lab #** 20017352-003 **Your Sample ID:** Sample #3

**Sample Composition:** Grab

**Your Project #**

**Your Project Name:** **Angola @ DNA**

**Sample Type:** Wastewater

**Collection Date:** 10/22/20 11:30

**Collected By:** Client

**Receipt Date:** 10/22/20 16:00

Escherichia coli, Colilert Method

| Analytical Method | Prep Method | Prep Date | By |
|---|---|---|---|
| Colilert | | | |

| Parameter | Result | Units | Qual | Quant. Limit | CAS # | Analysis Date | By |
|---|---|---|---|---|---|---|---|
| Escherichia coli | 816 | MPN/100 mL | | 1 | | 10/22/20 17:10 | kzaerr |

**Our Lab #** 20017352-004 **Your Sample ID:** Sample #4

**Sample Composition:** Grab

**Your Project #**

**Your Project Name:** **Angola @ DNA**

**Sample Type:** Wastewater

**Collection Date:** 10/22/20 12:00

**Collected By:** Client

**Receipt Date:** 10/22/20 16:00

Escherichia coli, Colilert Method

| Analytical Method | Prep Method | Prep Date | By |
|---|---|---|---|
| Colilert | | | |

| Parameter | Result | Units | Qual | Quant. Limit | CAS # | Analysis Date | By |
|---|---|---|---|---|---|---|---|
| Escherichia coli | >2419.6 | MPN/100 mL | | 1 | | 10/22/20 17:10 | kzaerr |

**Our Lab #** 20017352-005 **Your Sample ID:** Sample #5

**Sample Composition:** Grab

**Your Project #**

**Your Project Name:** **Angola @ DNA**

**Sample Type:** Wastewater

**Collection Date:** 10/22/20 12:20

**Collected By:** Client

**Receipt Date:** 10/22/20 16:00

Escherichia coli, Colilert Method

| Analytical Method | Prep Method | Prep Date | By |
|---|---|---|---|
| Colilert | | | |

| Parameter | Result | Units | Qual | Quant. Limit | CAS # | Analysis Date | By |
|---|---|---|---|---|---|---|---|
| Escherichia coli | 28 | MPN/100 mL | | 1 | | 10/22/20 17:10 | kzaerr |



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**Our Lab #** 20017352-006 **Your Sample ID:** Sample #6

**Sample Composition:** Grab

**Your Project #**

**Your Project Name:** **Angola @ DNA**

**Sample Type:** Wastewater

**Collection Date:** 10/22/20 12:35

**Collected By:** Client

**Receipt Date:** 10/22/20 16:00

Escherichia coli, Colilert Method

| Analytical Method | Prep Method | Prep Date | By |
|---|---|---|---|
| Colilert | | | |

| Parameter | Result | Units | Qual | Quant. Limit | CAS # | Analysis Date | By |
|---|---|---|---|---|---|---|---|
| Escherichia coli | 178 | MPN/100 mL | | 1 | | 10/22/20 17:10 | kzaerr |

**Our Lab #** 20017352-007 **Your Sample ID:** Sample #7

**Sample Composition:** Grab

**Your Project #**

**Your Project Name:** **Angola @ DNA**

**Sample Type:** Wastewater

**Collection Date:** 10/22/20 13:50

**Collected By:** Client

**Receipt Date:** 10/22/20 16:00

Escherichia coli, Colilert Method

| Analytical Method | Prep Method | Prep Date | By |
|---|---|---|---|
| Colilert | | | |

| Parameter | Result | Units | Qual | Quant. Limit | CAS # | Analysis Date | By |
|---|---|---|---|---|---|---|---|
| Escherichia coli | 184 | MPN/100 mL | | 1 | | 10/22/20 17:10 | kzaerr |

**Our Lab #** 20017352-008 **Your Sample ID:** Sample #8

**Sample Composition:** Grab

**Your Project #**

**Your Project Name:** **Angola @ DNA**

**Sample Type:** Wastewater

**Collection Date:** 10/22/20 14:00

**Collected By:** Client

**Receipt Date:** 10/22/20 16:00

Escherichia coli, Colilert Method

| Analytical Method | Prep Method | Prep Date | By |
|---|---|---|---|
| Colilert | | | |

| Parameter | Result | Units | Qual | Quant. Limit | CAS # | Analysis Date | By |
|---|---|---|---|---|---|---|---|
| Escherichia coli | 727 | MPN/100 mL | | 1 | | 10/22/20 17:10 | kzaerr |



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**Our Lab #** 20017352-009 **Your Sample ID:** Sample #9

**Sample Composition:** Grab

**Your Project #**

**Your Project Name:** **Angola @ DNA**

**Sample Type:** Wastewater

**Collection Date:** 10/22/20 14:15

**Collected By:** Client

**Receipt Date:** 10/22/20 16:00

Escherichia coli, Colilert Method

| Analytical Method | Prep Method | Prep Date | By |
|---|---|---|---|
| Colilert | | | |

| Parameter | Result | Units | Qual | Quant. Limit | CAS # | Analysis Date | By |
|---|---|---|---|---|---|---|---|
| Escherichia coli | 579 | MPN/100 mL | | 1 | | 10/22/20 17:10 | kzaerr |

**Our Lab #** 20017352-010 **Your Sample ID:** Sample #10

**Sample Composition:** Grab

**Your Project #**

**Your Project Name:** **Angola @ DNA**

**Sample Type:** Wastewater

**Collection Date:** 10/22/20 14:25

**Collected By:** Client

**Receipt Date:** 10/22/20 16:00

Escherichia coli, Colilert Method

| Analytical Method | Prep Method | Prep Date | By |
|---|---|---|---|
| Colilert | | | |

| Parameter | Result | Units | Qual | Quant. Limit | CAS # | Analysis Date | By |
|---|---|---|---|---|---|---|---|
| Escherichia coli | 1300 | MPN/100 mL | | 1 | | 10/22/20 17:10 | kzaerr |

**Our Lab #** 20017352-011 **Your Sample ID:** Sample #11

**Sample Composition:** Grab

**Your Project #**

**Your Project Name:** **Angola @ DNA**

**Sample Type:** Wastewater

**Collection Date:** 10/22/20 14:35

**Collected By:** Client

**Receipt Date:** 10/22/20 16:00

Escherichia coli, Colilert Method

| Analytical Method | Prep Method | Prep Date | By |
|---|---|---|---|
| Colilert | | | |

| Parameter | Result | Units | Qual | Quant. Limit | CAS # | Analysis Date | By |
|---|---|---|---|---|---|---|---|
| Escherichia coli | 4 | MPN/100 mL | | 1 | | 10/22/20 17:10 | kzaerr |



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**Our Lab #** 20017352-012 **Your Sample ID:** Sample #12

**Sample Composition:** Grab

**Your Project #**

**Your Project Name:** **Angola @ DNA**

**Sample Type:** Wastewater

**Collection Date:** 10/22/20 14:50

**Collected By:** Client

**Receipt Date:** 10/22/20 16:00

Escherichia coli, Colilert Method

| Analytical Method | Prep Method | Prep Date | By |
|---|---|---|---|
| Colilert | | | |

| Parameter | Result | Units | Qual | Quant. Limit | CAS # | Analysis Date | By |
|---|---|---|---|---|---|---|---|
| Escherichia coli | >2419.6 | MPN/100 mL | | 1 | | 10/22/20 17:10 | kzaerr |

**Our Lab #** 20017352-013 **Your Sample ID:** Sample #13

**Sample Composition:** Grab

**Your Project #**

**Your Project Name:** **Angola @ DNA**

**Sample Type:** Wastewater

**Collection Date:** 10/22/20 15:15

**Collected By:** Client

**Receipt Date:** 10/22/20 16:00

Escherichia coli, Colilert Method

| Analytical Method | Prep Method | Prep Date | By |
|---|---|---|---|
| Colilert | | | |

| Parameter | Result | Units | Qual | Quant. Limit | CAS # | Analysis Date | By |
|---|---|---|---|---|---|---|---|
| Escherichia coli | >2419.6 | MPN/100 mL | | 1 | | 10/22/20 17:10 | kzaerr |

**Our Lab #** 20017352-014 **Your Sample ID:** Sample #14

**Sample Composition:** Grab

**Your Project #**

**Your Project Name:** **Angola @ DNA**

**Sample Type:** Wastewater

**Collection Date:** 10/22/20 15:30

**Collected By:** Client

**Receipt Date:** 10/22/20 16:00

Escherichia coli, Colilert Method

| Analytical Method | Prep Method | Prep Date | By |
|---|---|---|---|
| Colilert | | | |

| Parameter | Result | Units | Qual | Quant. Limit | CAS # | Analysis Date | By |
|---|---|---|---|---|---|---|---|
| Escherichia coli | >2419.6 | MPN/100 mL | | 1 | | 10/22/20 17:10 | kzaerr |



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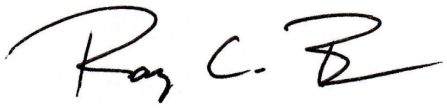
| | | | |
|---|---|---|---|
| **Our Lab #** | 20017352-015 | **Your Sample ID:** | Sample #16 |
| | | **Sample Composition:** | Grab |
| **Your Project #** | | **Collection Date:** | 10/22/20 15:50 |
| **Your Project Name:** | **Angola @ DNA** | **Collected By:** | Client |
| **Sample Type:** | Wastewater | **Receipt Date:** | 10/22/20 16:00 |

Escherichia coli, Colilert Method

| Analytical Method | Prep Method | Prep Date | By |
|---|---|---|---|
| Colilert | | | |

| Parameter | Result | Units | Qual | Quant. Limit | CAS # | Analysis Date | By |
|---|---|---|---|---|---|---|---|
| Escherichia coli | >2419.6 | MPN/100 mL | | 1 | | 10/22/20 17:10 | kzaerr |



11/4/2020

**Lab Manager** **Date**



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ASTBURY *Astbury Water Technology, Inc.*
***Northeast Regional Office***
601 West 400 North * Angola, Indiana 46703
Phone (260) 668-8900 * Fax (260) 668-8900

# CHAIN OF CUSTODY

| Client Name | ESG Work Order # |
|---|---|
| Biomonitor | 20017352 |
| **Project Name** | **Project #** |
| Angola eDNA | . |
| **Sampler(s) Signature** | |

| Stat No | DATE | TIME | COMP | GRAB | SAMPLE ID | Total Number of Containers | X e. coli | Preservation Code / Comments |
|---|---|---|---|---|---|---|---|---|
| | 10/22 | 10:15 | 10:15 | X | 1 | 1 | X | |
| | | 10:45 | | | 2 | | | Field pH |
| | | 11:30 | | | 3 | | | |
| | | 12:00 | | | 4 | | | |
| | | 12:20 | | | 5 | | | |
| | | 12:35 | | | 6 | | | |
| | | 13:50 | | | 7 | | | |
| | | 14:00 | | | 8 | | | |
| | | 14:15 | | | 9 | | | |
| | | 14:25 | | | 10 | | | |
| | | 14:35 | | | 11 | | | |
| | | 14:50 | | | 12 | | | |
| | ↓ | 15:15 | | | 13 | ↓ | ↓ | |

## TRANSFER OF CUSTODY

| | Date / Time |
|---|---|
| Relinquished By: | 10/22/2020 |
| Received By: Matt Dy | 16:00 |
| Relinquished By: | Date / Time |
| Received By: | |
| Relinquished By: | Date / Time |
| Received By: | |

## SAMPLE CONDITION UPON RECEIPT

| | |
|---|---|
| Sample Temp: | °C |
| Received on Ice: | Y / N |
| Samples Intact: | Y / N |
| Adequate Volume: | Y / N |
| Appropriate Containers: | Y / N |
| Appropriate Preservation: | Y / N |
| Within Hold Time: | Y / N |
| Head Space Absent: | Y / N / NA |

## TURN AROUND TIME

Normal _____ Rush _____

Requested Due Date: _____

## SAMPLE COMMENTS

*Please note if sample(s) suspected to be hazardous, corrosive, or requires special handling for any reason.*

## pH METER CALIBRATION

4.00 _____ 7.00 _____ 10.00 _____

## PRESERVATION CODES

| | |
|---|---|
| N = $HNO_3$ / Nitric Acid | U = Unpreserved, Cooled to 4°C |
| S = $H_2SO_4$ / Sulfuric Acid | OH = NaOH / Sodium Hydroxide |
| H = HCl / Hydrochloric Acid | SO = $Na_2S_2O_3$ / Sodium Thiosulfate |

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***Northeast Regional Office***
601 West 400 North * Angola, Indiana 46703
Phone (260) 668-8900 * Fax (260) 668-8900

# CHAIN OF CUSTODY

Client Name: Biomonitor
ESG Work Order #: 20017352
Project Name: Angola eDNA
Project #:
Sampler(s) Signature:

| Stat No | DATE | TIME | COMP | GRAB | SAMPLE ID | Total Number of Containers | E. coli | Prevervation Code |
|---|---|---|---|---|---|---|---|---|
| | 10/22 | 15:30 | | X | 14 | 1 | X | |
| | 10/22 | 15:50 | | X | 16 | 1 | X | Field pH |

Comments

## TRANSFER OF CUSTODY

| | Date / Time |
|---|---|
| Relinquished By: | 10/22/2020 |
| Received By: | 16:00 |
| Relinquished By: | |
| Received By: | |
| Relinquished By: | |
| Received By: | |

## SAMPLE CONDITION UPON RECEIPT

Sample Temp: _____ °C
Received on Ice: Y / N
Samples Intact: Y / N
Adequate Volume: Y / N
Appropriate Containers: Y / N
Appropriate Preservation: Y / N
Within Hold Time: Y / N
Head Space Absent: Y / N / NA

## TURN AROUND TIME

Normal _____ Rush _____
Requested Due Date: _____

## SAMPLE COMMENTS

*Please note if sample(s) suspected to be hazardous, corrosive, or requires special handling for any reason.*

## pH METER CALIBRATION

4.00 _____ 7.00 _____ 10.00 _____

## PRESERVATION CODES

N = $HNO_3$ / Nitric Acid
S = $H_2SO_4$ / Sulfuric Acid
H = HCl / Hydrochloric Acid
U = Unpreserved, Cooled to 4°C
OH = NaOH / Sodium Hydroxide
SO = $Na_2S_2O_3$ / Sodium Thiosulfate

APPENDIX 2

# Jonah Ventures qPCR Report

JONAH VENTURES

KNOWLEDGE IN SEQUENCE

November 15 2020

For more information go to www.jonahventures.com

info@jonahventures.com

ClientID = 1096

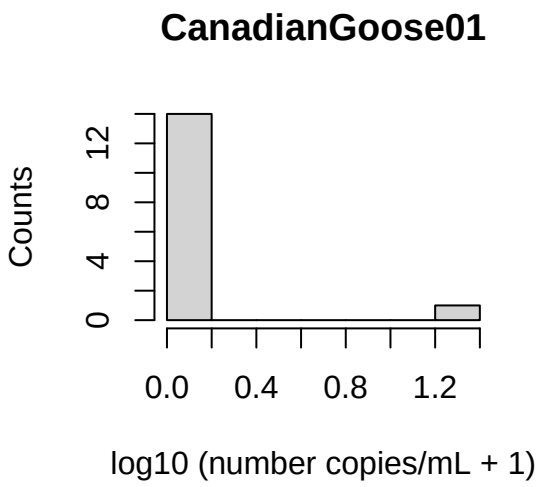
Last Name = Bright

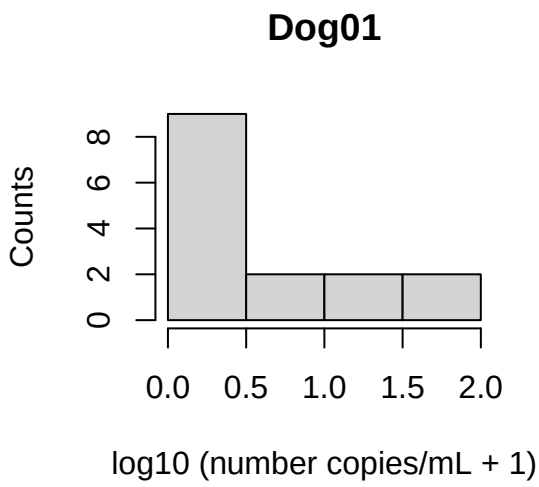
BatchID = JVB0065

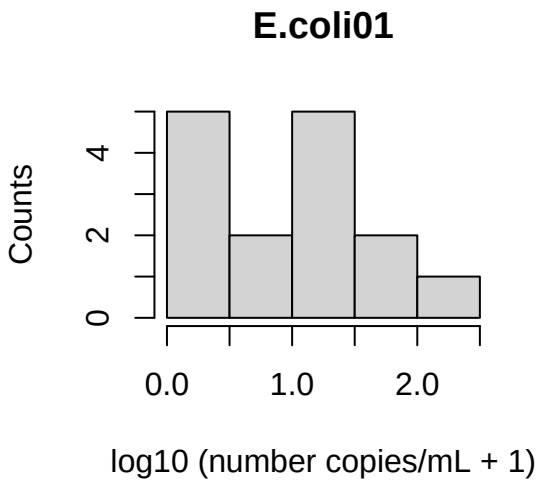
Number samples analyzed = 15

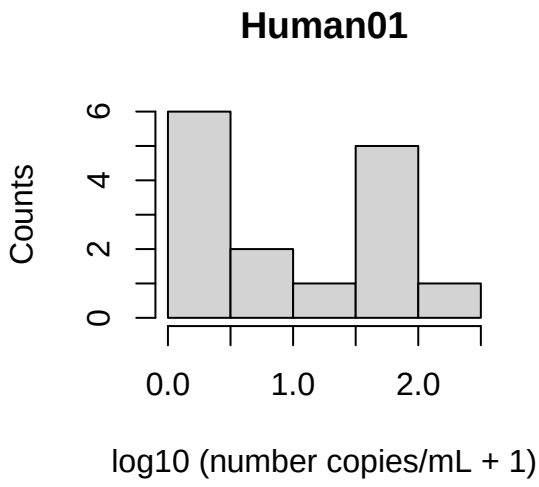
## Histograms

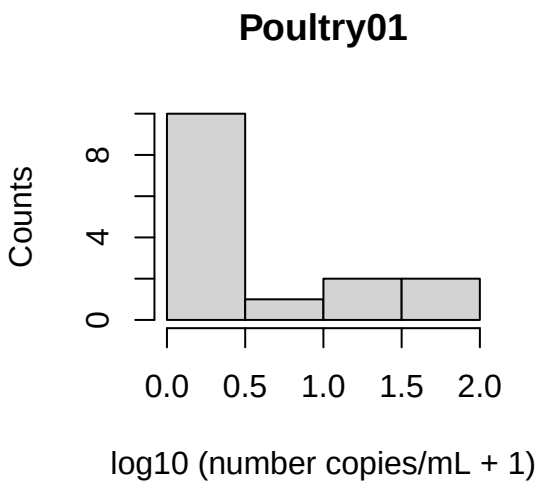
Shown are histograms for the distribution of the data for each assay. x-axis is log transformed copies per 100 mL (if data on water volume provided) after adding 1 to show zeros. y-axis represents count of samples in each category.




Poultry01
Counts
0
4
8
0.0
0.5
1.0
1.5
2.0
log10 (number copies/mL + 1)

## Table 1. Average Number of Copies for Each Assay

This table provides data on the average number of copies that were detected for each sample for each assay.

RunID = an internal identification number. Can be used by the client to look up which calibration curve applies to each sample

SampleID = Jonah Sample ID provided by client.

Subsequent columns represent the number of copies per filtered 100 mL of water (if data provided) for each assay averaged across internal replicates. The column name denotes the assay name.

| | SampleID | CanadianGoose01 | Dog01 | E.coli01 | Human01 | Poultry01 |
|---|---|---|---|---|---|---|
| 1 | 4688 | 0 | 4 | 0 | 33 | 0 |
| 2 | 4706 | 0 | 1 | 0 | 40 | 0 |
| 3 | 4731 | 0 | 64 | 0 | 0 | 0 |
| 4 | 4735 | 0 | 0 | 0 | 60 | 0 |
| 5 | 4801 | 0 | 34 | 6 | 144 | 22 |
| 6 | 5U7DT1KJ | 17 | 0 | 1 | 4 | 0 |
| 7 | 7VZPXUE6 | 0 | 0 | 14 | 31 | 6 |
| 8 | 8F6V0298 | 0 | 22 | 14 | 0 | 43 |
| 9 | IO5MY3PF | 0 | 0 | 15 | 0 | 0 |
| 10 | L4ZGQVKB | 0 | 0 | 4 | 0 | 0 |
| 11 | P6BWTK6U | 0 | 7 | 78 | 18 | 0 |
| 12 | UIHBK49K | 0 | 22 | 128 | 1 | 18 |
| 13 | UOV2FTD5 | 0 | 0 | 42 | 59 | 32 |
| 14 | V6H14MOG | 0 | 0 | 11 | 5 | 0 |
| 15 | XLZ9XXP9 | 0 | 0 | 27 | 0 | 0 |

# Table 2. Percent of Replicates Above Detection Limit for Each Assay

This table provides data on what percentage of the replicates that were run were above the detection limit. The detection limit is as high as the lowest positive on the calibration curve, but can be up to an order of magnitude lower. For example, a calibration curve might generate a positive at 100 copies and no positive for 10 copies, but the actual detection limit would be 11 copies. See Table 3 for the range of number of copies for each assay.

RunID = an internal identification number. Can be used by the client to look up which calibration curve applies to each sample

SampleID = Jonah Sample ID provided by client.

Subsequent columns show the percent of all replicates that were above detection limit for each assay. The column name denotes the assay name.

| | RunID | SampleID | CanadianGoose01 | Dog01 | E.coli01 | Human01 | Poultry01 |
|---|---|---|---|---|---|---|---|
| 1 | JVQ0128 | 5U7DT1KJ | 0 | 0.0 | 0.0 | 33.3 | 0.0 |
| 2 | JVQ0128 | 8F6V0298 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3 | JVQ0128 | L4ZGQVKB | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4 | JVQ0128 | UIHBK49K | 0 | 0.0 | 0.0 | 33.3 | 0.0 |
| 5 | JVQ0128 | UOV2FTD5 | 0 | 0.0 | 0.0 | 66.7 | 0.0 |
| 6 | JVQ0129 | 5U7DT1KJ | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 7 | JVQ0129 | 8F6V0298 | 0 | 33.3 | 0.0 | 0.0 | 33.3 |
| 8 | JVQ0129 | L4ZGQVKB | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 9 | JVQ0129 | UIHBK49K | 0 | 33.3 | 0.0 | 0.0 | 33.3 |
| 10 | JVQ0129 | UOV2FTD5 | 0 | 0.0 | 0.0 | 0.0 | 33.3 |
| 11 | JVQ0130 | 5U7DT1KJ | 0 | 0.0 | 66.7 | 0.0 | 0.0 |
| 12 | JVQ0130 | 8F6V0298 | 0 | 0.0 | 100.0 | 0.0 | 0.0 |
| 13 | JVQ0130 | L4ZGQVKB | 0 | 0.0 | 66.7 | 0.0 | 0.0 |
| 14 | JVQ0130 | UIHBK49K | 0 | 0.0 | 100.0 | 0.0 | 0.0 |
| 15 | JVQ0130 | UOV2FTD5 | 0 | 0.0 | 100.0 | 0.0 | 0.0 |
| 16 | JVQ0132 | 7VZPXUE6 | 0 | 0.0 | 0.0 | 66.7 | 0.0 |
| 17 | JVQ0132 | IO5MY3PF | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 18 | JVQ0132 | P6BWTK6U | 0 | 0.0 | 0.0 | 33.3 | 0.0 |
| 19 | JVQ0132 | V6H14MOG | 0 | 0.0 | 0.0 | 33.3 | 0.0 |
| 20 | JVQ0132 | XLZ9XXP9 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 21 | JVQ0133 | 7VZPXUE6 | 0 | 0.0 | 0.0 | 0.0 | 100.0 |
| 22 | JVQ0133 | IO5MY3PF | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 23 | JVQ0133 | P6BWTK6U | 0 | 33.3 | 0.0 | 0.0 | 0.0 |
| 24 | JVQ0133 | V6H14MOG | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 25 | JVQ0133 | XLZ9XXP9 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 26 | JVQ0134 | 7VZPXUE6 | 0 | 0.0 | 100.0 | 0.0 | 0.0 |
| 27 | JVQ0134 | IO5MY3PF | 0 | 0.0 | 100.0 | 0.0 | 0.0 |
| 28 | JVQ0134 | P6BWTK6U | 0 | 0.0 | 100.0 | 0.0 | 0.0 |
| 29 | JVQ0134 | V6H14MOG | 0 | 0.0 | 100.0 | 0.0 | 0.0 |
| 30 | JVQ0134 | XLZ9XXP9 | 0 | 0.0 | 100.0 | 0.0 | 0.0 |
| 31 | JVQ0135 | 5U7DT1KJ | 100 | 0.0 | 0.0 | 0.0 | 0.0 |
| 32 | JVQ0135 | 7VZPXUE6 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 33 | JVQ0135 | 8F6V0298 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 34 | JVQ0135 | IO5MY3PF | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 35 | JVQ0135 | L4ZGQVKB | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 36 | JVQ0135 | P6BWTK6U | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 37 | JVQ0135 | UIHBK49K | 0 | 0.0 | 0.0 | 0.0 | 0.0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 38 | JVQ0135 | UOV2FTD5 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 39 | JVQ0135 | V6H14MOG | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 40 | JVQ0135 | XLZ9XXP9 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 41 | JVQ0136 | 4688 | 0 | 0.0 | 0.0 | 100.0 | 0.0 |
| 42 | JVQ0136 | 4706 | 0 | 0.0 | 0.0 | 66.7 | 0.0 |
| 43 | JVQ0136 | 4731 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 44 | JVQ0136 | 4735 | 0 | 0.0 | 0.0 | 66.7 | 0.0 |
| 45 | JVQ0136 | 4801 | 0 | 0.0 | 0.0 | 66.7 | 0.0 |
| 46 | JVQ0137 | 4688 | 0 | 33.3 | 0.0 | 0.0 | 0.0 |
| 47 | JVQ0137 | 4706 | 0 | 33.3 | 0.0 | 0.0 | 0.0 |
| 48 | JVQ0137 | 4731 | 0 | 33.3 | 0.0 | 0.0 | 0.0 |
| 49 | JVQ0137 | 4735 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 50 | JVQ0137 | 4801 | 0 | 33.3 | 0.0 | 0.0 | 66.7 |
| 51 | JVQ0138 | 4688 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 52 | JVQ0138 | 4706 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 53 | JVQ0138 | 4731 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 54 | JVQ0138 | 4735 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 55 | JVQ0138 | 4801 | 0 | 0.0 | 33.3 | 0.0 | 0.0 |
| 56 | JVQ0139 | 4688 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 57 | JVQ0139 | 4706 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 58 | JVQ0139 | 4731 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 59 | JVQ0139 | 4735 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 60 | JVQ0139 | 4801 | 0 | 0.0 | 0.0 | 0.0 | 0.0 |

## Table 3. All data (copies/100ml)

| | ClientID | RunID | Assay | SampleID | Rep1 | Rep2 | Rep3 |
|---|---|---|---|---|---|---|---|
| 1 | 1096 | JVQ0128 | Human01 | 5U7DT1KJ | 11 | 0 | 0 |
| 2 | 1096 | JVQ0128 | Human01 | 8F6V0298 | 0 | 0 | 0 |
| 3 | 1096 | JVQ0128 | Human01 | L4ZGQVKB | 0 | 0 | 0 |
| 4 | 1096 | JVQ0128 | Human01 | UIHBK49K | 0 | 2 | 0 |
| 5 | 1096 | JVQ0128 | Human01 | UOV2FTD5 | 0 | 144 | 33 |
| 6 | 1096 | JVQ0128 | Swine01 | 5U7DT1KJ | 0 | 0 | 0 |
| 7 | 1096 | JVQ0128 | Swine01 | 8F6V0298 | 0 | 0 | 0 |
| 8 | 1096 | JVQ0128 | Swine01 | L4ZGQVKB | 0 | 0 | 0 |
| 9 | 1096 | JVQ0128 | Swine01 | UIHBK49K | 0 | 0 | 0 |
| 10 | 1096 | JVQ0128 | Swine01 | UOV2FTD5 | 0 | 0 | 0 |
| 11 | 1096 | JVQ0128 | Bovine01 | 5U7DT1KJ | 0 | 0 | 0 |
| 12 | 1096 | JVQ0128 | Bovine01 | 8F6V0298 | 0 | 0 | 0 |
| 13 | 1096 | JVQ0128 | Bovine01 | L4ZGQVKB | 0 | 0 | 0 |
| 14 | 1096 | JVQ0128 | Bovine01 | UIHBK49K | 0 | 0 | 0 |
| 15 | 1096 | JVQ0128 | Bovine01 | UOV2FTD5 | 0 | 0 | 0 |
| 16 | 1096 | JVQ0129 | Poultry01 | 5U7DT1KJ | 0 | 0 | 0 |
| 17 | 1096 | JVQ0129 | Poultry01 | 8F6V0298 | 128 | 0 | 0 |
| 18 | 1096 | JVQ0129 | Poultry01 | L4ZGQVKB | 0 | 0 | 0 |
| 19 | 1096 | JVQ0129 | Poultry01 | UIHBK49K | 0 | 53 | 0 |
| 20 | 1096 | JVQ0129 | Poultry01 | UOV2FTD5 | 97 | 0 | 0 |
| 21 | 1096 | JVQ0129 | Sheep01 | 5U7DT1KJ | 0 | 0 | 0 |
| 22 | 1096 | JVQ0129 | Sheep01 | 8F6V0298 | 0 | 0 | 0 |
| 23 | 1096 | JVQ0129 | Sheep01 | L4ZGQVKB | 0 | 0 | 0 |
| 24 | 1096 | JVQ0129 | Sheep01 | UIHBK49K | 0 | 0 | 0 |
| 25 | 1096 | JVQ0129 | Sheep01 | UOV2FTD5 | 0 | 0 | 0 |
| 26 | 1096 | JVQ0129 | Dog01 | 5U7DT1KJ | 0 | 0 | 0 |
| 27 | 1096 | JVQ0129 | Dog01 | 8F6V0298 | 0 | 0 | 67 |
| 28 | 1096 | JVQ0129 | Dog01 | L4ZGQVKB | 0 | 0 | 0 |
| 29 | 1096 | JVQ0129 | Dog01 | UIHBK49K | 0 | 65 | 0 |
| 30 | 1096 | JVQ0129 | Dog01 | UOV2FTD5 | 0 | 0 | 0 |
| 31 | 1096 | JVQ0130 | E.coli01 | 5U7DT1KJ | 1 | 0 | 3 |
| 32 | 1096 | JVQ0130 | E.coli01 | 8F6V0298 | 5 | 10 | 28 |
| 33 | 1096 | JVQ0130 | E.coli01 | L4ZGQVKB | 0 | 9 | 3 |
| 34 | 1096 | JVQ0130 | E.coli01 | UIHBK49K | 102 | 141 | 140 |
| 35 | 1096 | JVQ0130 | E.coli01 | UOV2FTD5 | 40 | 14 | 73 |
| 36 | 1096 | JVQ0132 | Human01 | 7VZPXUE6 | 60 | 32 | 0 |
| 37 | 1096 | JVQ0132 | Human01 | IO5MY3PF | 0 | 0 | 0 |
| 38 | 1096 | JVQ0132 | Human01 | P6BWTK6U | 0 | 0 | 54 |
| 39 | 1096 | JVQ0132 | Human01 | V6H14MOG | 0 | 16 | 0 |
| 40 | 1096 | JVQ0132 | Human01 | XLZ9XXP9 | 0 | 0 | 0 |
| 41 | 1096 | JVQ0132 | Swine01 | 7VZPXUE6 | 0 | 0 | 0 |
| 42 | 1096 | JVQ0132 | Swine01 | IO5MY3PF | 0 | 0 | 0 |
| 43 | 1096 | JVQ0132 | Swine01 | P6BWTK6U | 0 | 0 | 0 |
| 44 | 1096 | JVQ0132 | Swine01 | V6H14MOG | 0 | 0 | 0 |
| 45 | 1096 | JVQ0132 | Swine01 | XLZ9XXP9 | 0 | 0 | 0 |
| 46 | 1096 | JVQ0132 | Bovine01 | 7VZPXUE6 | 0 | 0 | 0 |
| 47 | 1096 | JVQ0132 | Bovine01 | IO5MY3PF | 0 | 0 | 0 |
| 48 | 1096 | JVQ0132 | Bovine01 | P6BWTK6U | 0 | 0 | 0 |
| 49 | 1096 | JVQ0132 | Bovine01 | V6H14MOG | 0 | 0 | 0 |
| 50 | 1096 | JVQ0132 | Bovine01 | XLZ9XXP9 | 0 | 0 | 0 |
| 51 | 1096 | JVQ0133 | Poultry01 | 7VZPXUE6 | 10 | 4 | 5 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 52 | 1096 | JVQ0133 | Poultry01 | IO5MY3PF | 0 | 0 | 0 |
| 53 | 1096 | JVQ0133 | Poultry01 | P6BWTK6U | 0 | 0 | 0 |
| 54 | 1096 | JVQ0133 | Poultry01 | V6H14MOG | 0 | 0 | 0 |
| 55 | 1096 | JVQ0133 | Poultry01 | XLZ9XXP9 | 0 | 0 | 0 |
| 56 | 1096 | JVQ0133 | Sheep01 | 7VZPXUE6 | 0 | 0 | 0 |
| 57 | 1096 | JVQ0133 | Sheep01 | IO5MY3PF | 0 | 0 | 0 |
| 58 | 1096 | JVQ0133 | Sheep01 | P6BWTK6U | 0 | 0 | 0 |
| 59 | 1096 | JVQ0133 | Sheep01 | V6H14MOG | 0 | 0 | 0 |
| 60 | 1096 | JVQ0133 | Sheep01 | XLZ9XXP9 | 0 | 0 | 0 |
| 61 | 1096 | JVQ0133 | Dog01 | 7VZPXUE6 | 0 | 0 | 0 |
| 62 | 1096 | JVQ0133 | Dog01 | IO5MY3PF | 0 | 0 | 0 |
| 63 | 1096 | JVQ0133 | Dog01 | P6BWTK6U | 20 | 0 | 0 |
| 64 | 1096 | JVQ0133 | Dog01 | V6H14MOG | 0 | 0 | 0 |
| 65 | 1096 | JVQ0133 | Dog01 | XLZ9XXP9 | 0 | 0 | 0 |
| 66 | 1096 | JVQ0134 | E.coli01 | 7VZPXUE6 | 14 | 9 | 20 |
| 67 | 1096 | JVQ0134 | E.coli01 | IO5MY3PF | 15 | 17 | 14 |
| 68 | 1096 | JVQ0134 | E.coli01 | P6BWTK6U | 83 | 79 | 71 |
| 69 | 1096 | JVQ0134 | E.coli01 | V6H14MOG | 1 | 6 | 27 |
| 70 | 1096 | JVQ0134 | E.coli01 | XLZ9XXP9 | 13 | 26 | 43 |
| 71 | 1096 | JVQ0135 | CanadianGoose01 | 5U7DT1KJ | 13 | 21 | 18 |
| 72 | 1096 | JVQ0135 | CanadianGoose01 | 7VZPXUE6 | 0 | 0 | 0 |
| 73 | 1096 | JVQ0135 | CanadianGoose01 | 8F6V0298 | 0 | 0 | 0 |
| 74 | 1096 | JVQ0135 | CanadianGoose01 | IO5MY3PF | 0 | 0 | 0 |
| 75 | 1096 | JVQ0135 | CanadianGoose01 | L4ZGQVKB | 0 | 0 | 0 |
| 76 | 1096 | JVQ0135 | CanadianGoose01 | P6BWTK6U | 0 | 0 | 0 |
| 77 | 1096 | JVQ0135 | CanadianGoose01 | UIHBK49K | 0 | 0 | 0 |
| 78 | 1096 | JVQ0135 | CanadianGoose01 | UOV2FTD5 | 0 | 0 | 0 |
| 79 | 1096 | JVQ0135 | CanadianGoose01 | V6H14MOG | 0 | 0 | 0 |
| 80 | 1096 | JVQ0135 | CanadianGoose01 | XLZ9XXP9 | 0 | 0 | 0 |
| 81 | 1096 | JVQ0136 | Human01 | 4688 | 55 | 23 | 20 |
| 82 | 1096 | JVQ0136 | Human01 | 4706 | 69 | 0 | 51 |
| 83 | 1096 | JVQ0136 | Human01 | 4731 | 0 | 0 | 0 |
| 84 | 1096 | JVQ0136 | Human01 | 4735 | 0 | 52 | 129 |
| 85 | 1096 | JVQ0136 | Human01 | 4801 | 67 | 0 | 364 |
| 86 | 1096 | JVQ0136 | Swine01 | 4688 | 0 | 0 | 0 |
| 87 | 1096 | JVQ0136 | Swine01 | 4706 | 0 | 0 | 0 |
| 88 | 1096 | JVQ0136 | Swine01 | 4731 | 0 | 0 | 0 |
| 89 | 1096 | JVQ0136 | Swine01 | 4735 | 0 | 0 | 0 |
| 90 | 1096 | JVQ0136 | Swine01 | 4801 | 0 | 0 | 0 |
| 91 | 1096 | JVQ0136 | Bovine01 | 4688 | 0 | 0 | 0 |
| 92 | 1096 | JVQ0136 | Bovine01 | 4706 | 0 | 0 | 0 |
| 93 | 1096 | JVQ0136 | Bovine01 | 4731 | 0 | 0 | 0 |
| 94 | 1096 | JVQ0136 | Bovine01 | 4735 | 0 | 0 | 0 |
| 95 | 1096 | JVQ0136 | Bovine01 | 4801 | 0 | 0 | 0 |
| 96 | 1096 | JVQ0137 | Poultry01 | 4688 | 0 | 0 | 0 |
| 97 | 1096 | JVQ0137 | Poultry01 | 4706 | 0 | 0 | 0 |
| 98 | 1096 | JVQ0137 | Poultry01 | 4731 | 0 | 0 | 0 |
| 99 | 1096 | JVQ0137 | Poultry01 | 4735 | 0 | 0 | 0 |
| 100 | 1096 | JVQ0137 | Poultry01 | 4801 | 28 | 38 | 0 |
| 101 | 1096 | JVQ0137 | Sheep01 | 4688 | 0 | 0 | 0 |
| 102 | 1096 | JVQ0137 | Sheep01 | 4706 | 0 | 0 | 0 |
| 103 | 1096 | JVQ0137 | Sheep01 | 4731 | 0 | 0 | 0 |
| 104 | 1096 | JVQ0137 | Sheep01 | 4735 | 0 | 0 | 0 |
| 105 | 1096 | JVQ0137 | Sheep01 | 4801 | 0 | 0 | 0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 106 | 1096 | JVQ0137 | Dog01 | 4688 | 0 | 13 | 0 |
| 107 | 1096 | JVQ0137 | Dog01 | 4706 | 0 | 0 | 2 |
| 108 | 1096 | JVQ0137 | Dog01 | 4731 | 0 | 191 | 0 |
| 109 | 1096 | JVQ0137 | Dog01 | 4735 | 0 | 0 | 0 |
| 110 | 1096 | JVQ0137 | Dog01 | 4801 | 0 | 102 | 0 |
| 111 | 1096 | JVQ0138 | E.coli01 | 4688 | 0 | 0 | 0 |
| 112 | 1096 | JVQ0138 | E.coli01 | 4706 | 0 | 0 | 0 |
| 113 | 1096 | JVQ0138 | E.coli01 | 4731 | 0 | 0 | 0 |
| 114 | 1096 | JVQ0138 | E.coli01 | 4735 | 0 | 0 | 0 |
| 115 | 1096 | JVQ0138 | E.coli01 | 4801 | 19 | 0 | 0 |
| 116 | 1096 | JVQ0139 | CanadianGoose01 | 4688 | 0 | 0 | 0 |
| 117 | 1096 | JVQ0139 | CanadianGoose01 | 4706 | 0 | 0 | 0 |
| 118 | 1096 | JVQ0139 | CanadianGoose01 | 4731 | 0 | 0 | 0 |
| 119 | 1096 | JVQ0139 | CanadianGoose01 | 4735 | 0 | 0 | 0 |
| 120 | 1096 | JVQ0139 | CanadianGoose01 | 4801 | 0 | 0 | 0 |

## Calibration curves

Each assay in each run is associated with a calibration curve based typically on a series of 7 10-fold dilutions of a known standard.

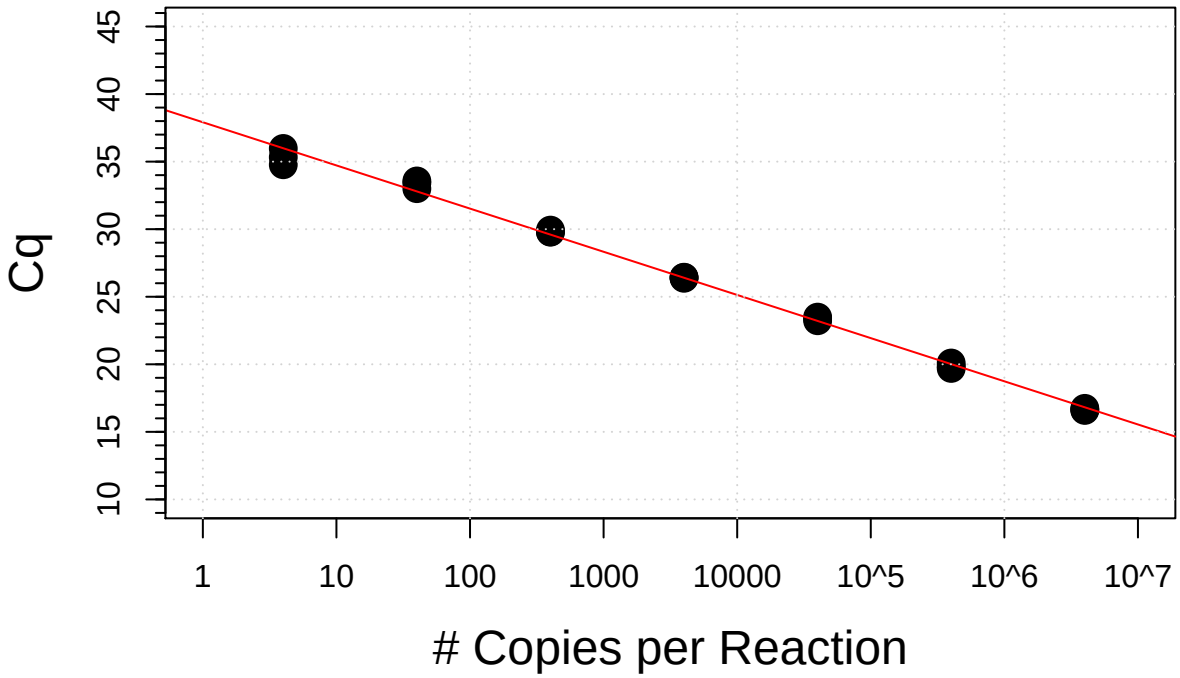
The calibration curve shown is for the number of cycles vs. the log10 of the number of copies in the standard. A linear regression is applied to this relationship and the r2 intercept and slope extracted for further analyses.

RunID = an internal identification number. Can be used by the client to match the calibration curve applies with each sample for an assay

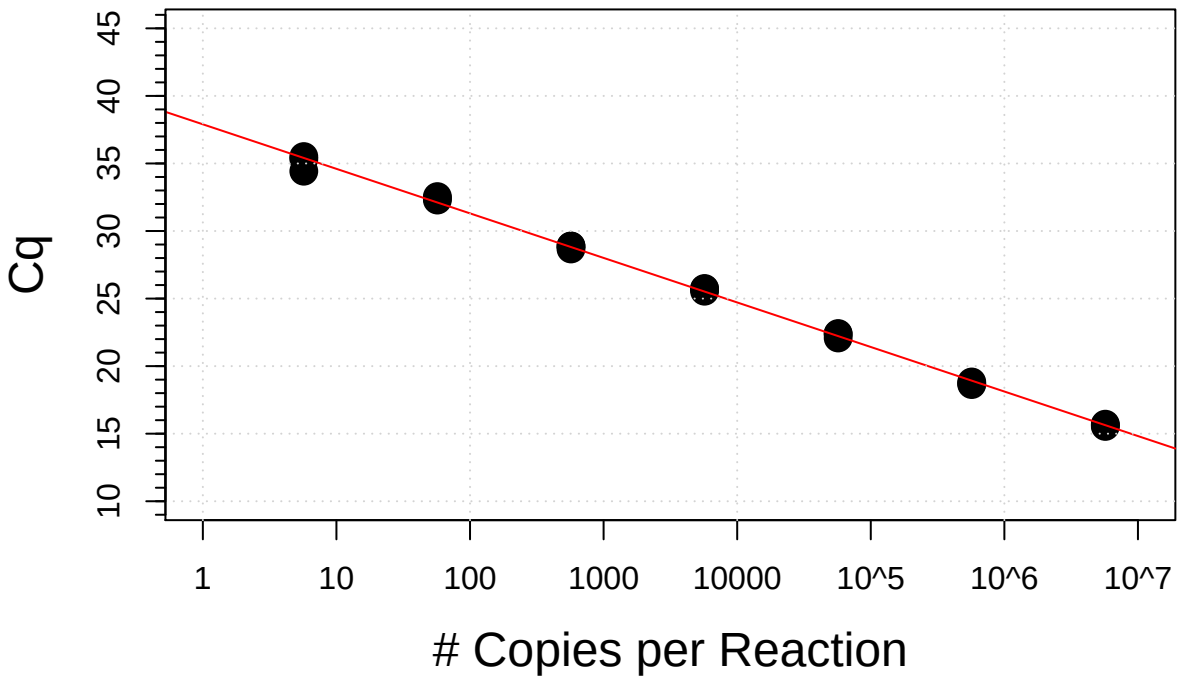
Assay = the name of the assay for the calibration curve in the particular run

r2 = the coefficient of determination, or goodness of fit for the linear relationship. Typically, r2 should be $> 0.98$.

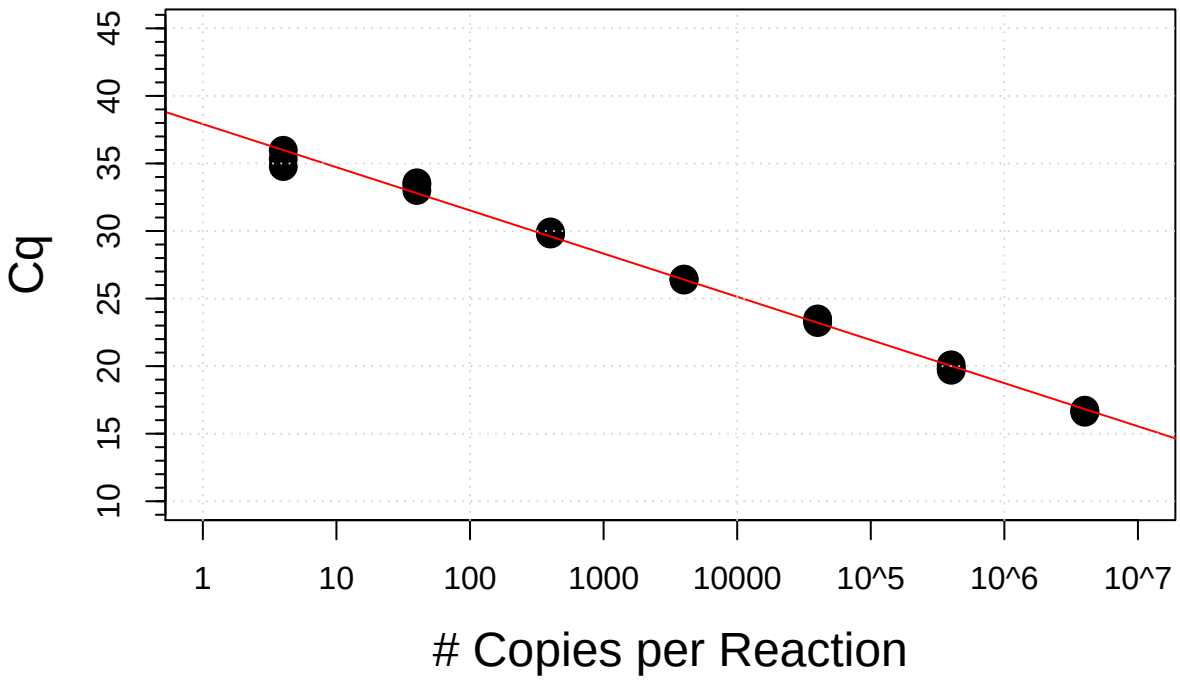
efficiency = how close to a doubling of product with each PCR cycle. For a 10-fold dilution, 100% efficiency is for ~3.3 cycles per 10-fold dilution. A range of values is acceptable here, but we try to keep efficiency between 85% - 110%.



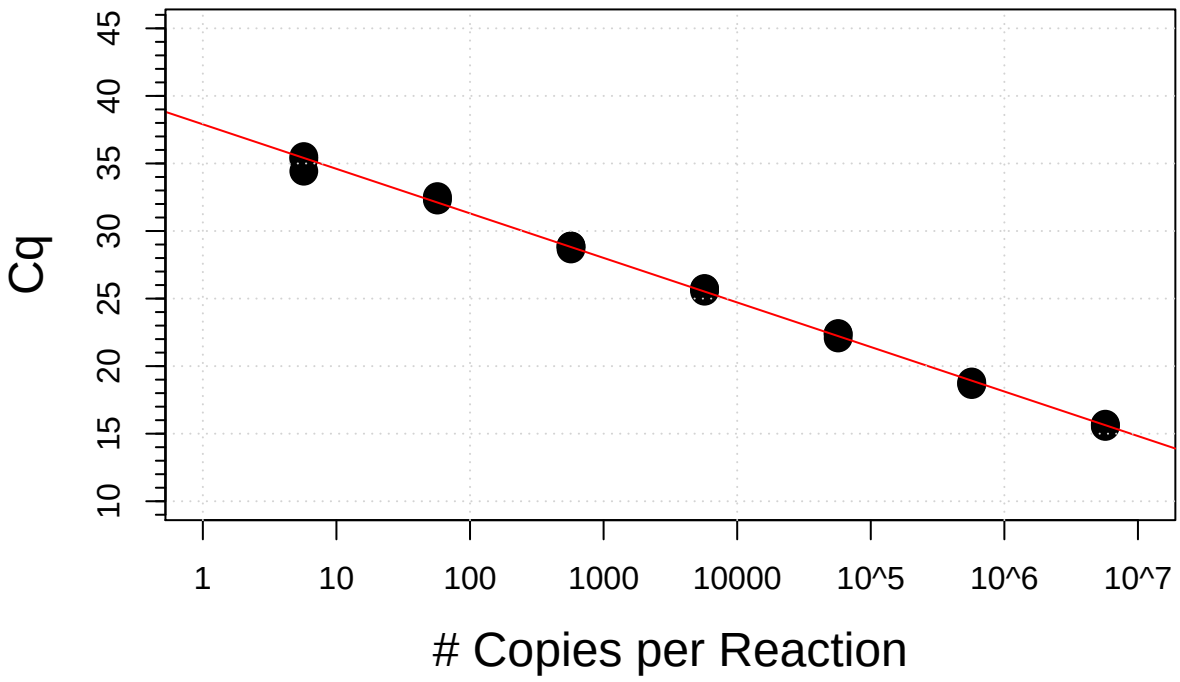

```
[1] "Calibration Curve"
[1] "RunID = JVQ0128"
[1] "Assay = Human01"
[1] "r2 = 0.996"
[1] "efficiency = 106%"
```



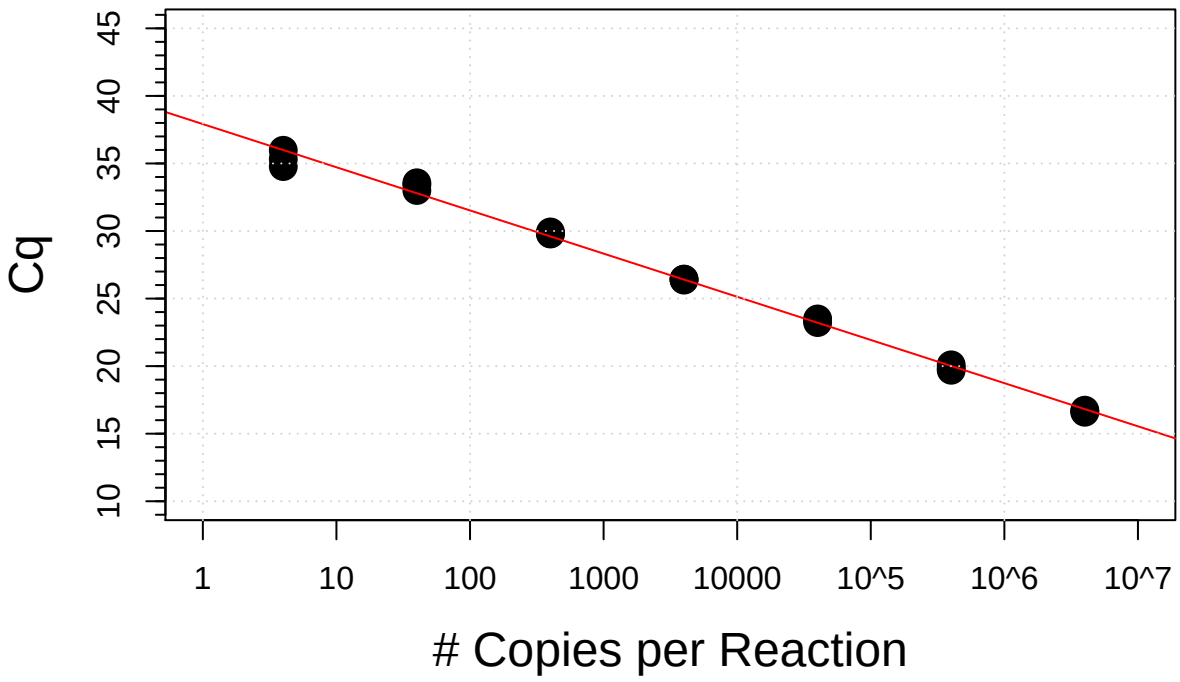

```
[1] "Calibration Curve"
[1] "RunID = JVQ0129"
[1] "Assay = Poultry01"
[1] "r2 = 0.998"
[1] "efficiency = 101%"
```



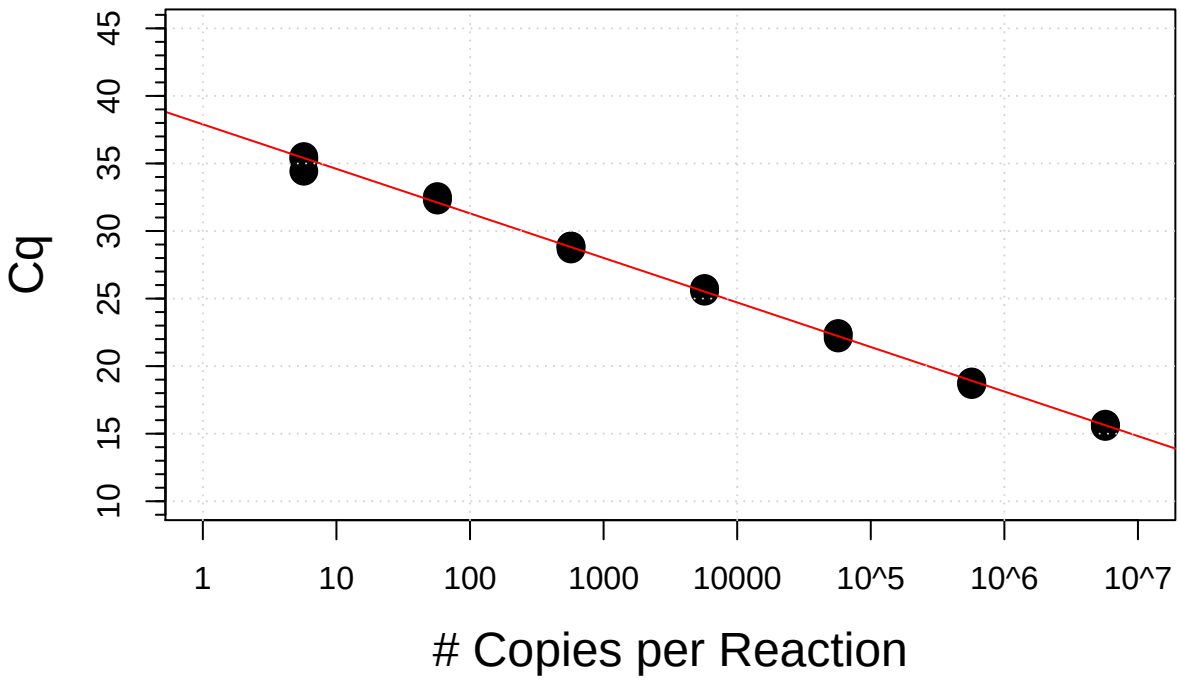

```
[1] "Calibration Curve"
[1] "RunID = JVQ0132"
[1] "Assay = Human01"
[1] "r2 = 0.996"
[1] "efficiency = 106%"
```



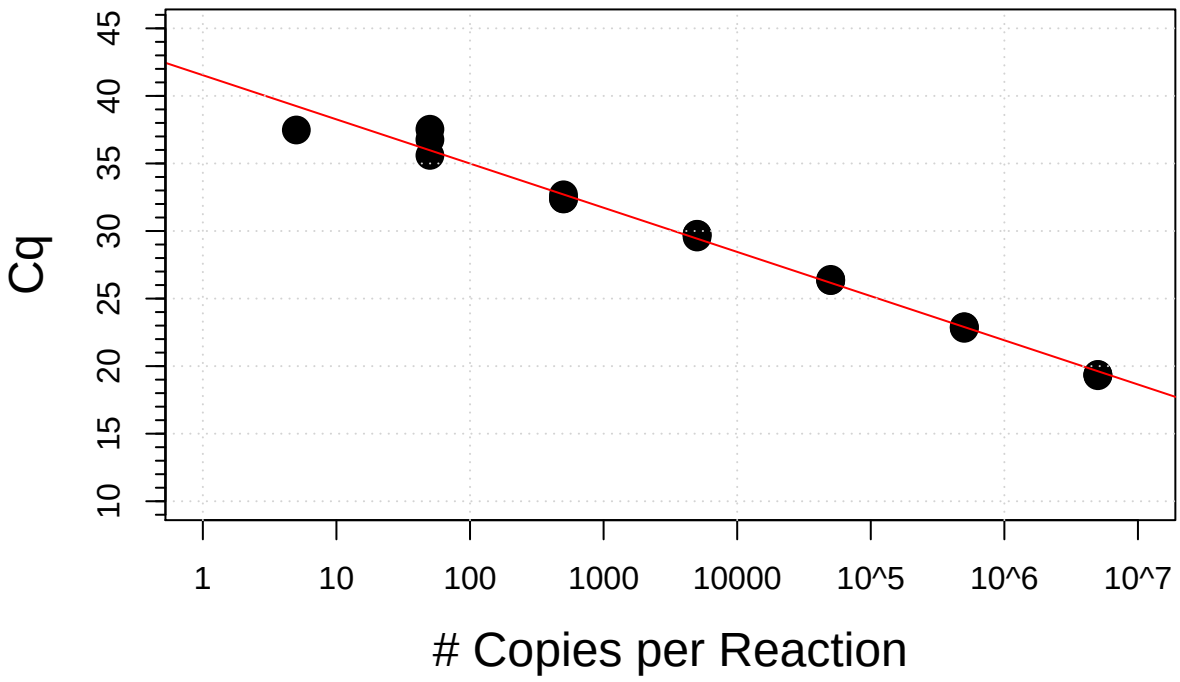

```
[1] "Calibration Curve"
[1] "RunID = JVQ0133"
[1] "Assay = Poultry01"
[1] "r2 = 0.998"
[1] "efficiency = 101%"
```



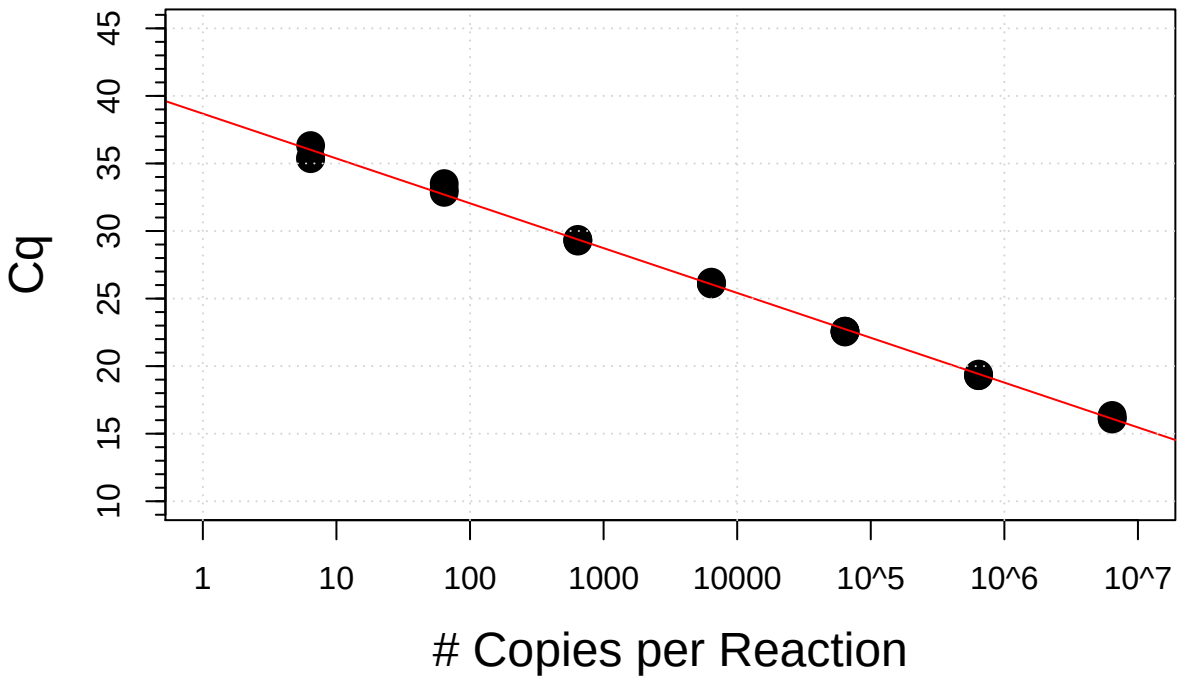

```
[1] "Calibration Curve"
[1] "RunID = JVQ0136"
[1] "Assay = Human01"
[1] "r2 = 0.996"
[1] "efficiency = 106%"
```



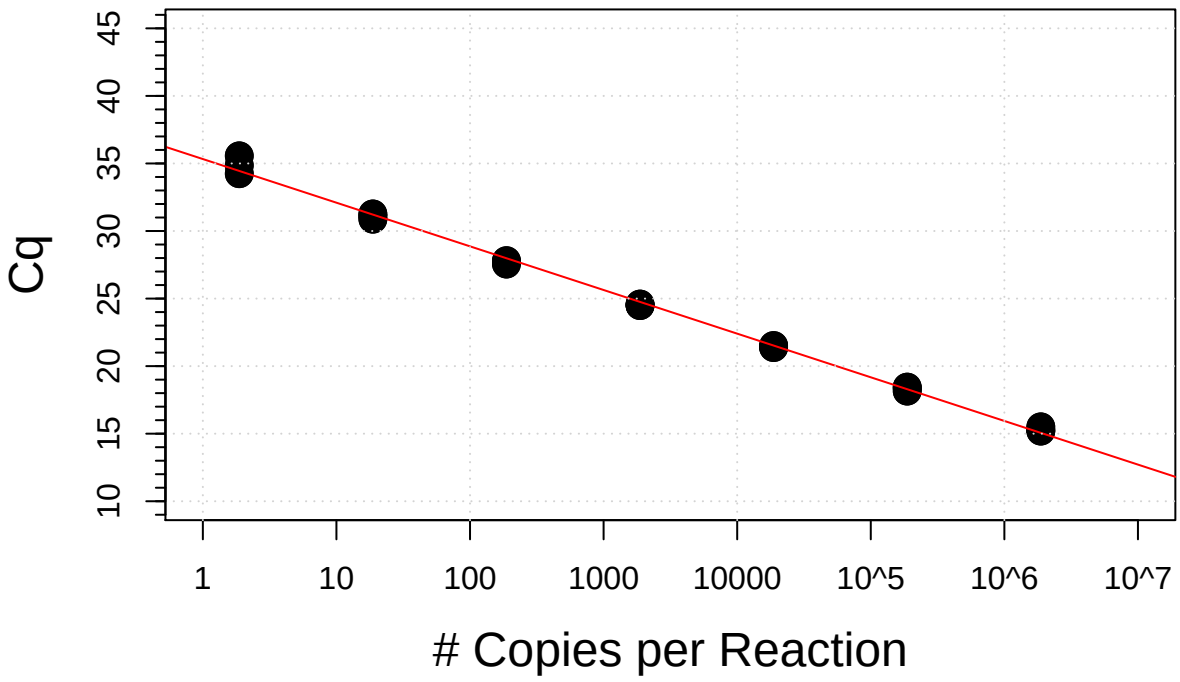

```
[1] "Calibration Curve"
[1] "RunID = JVQ0137"
[1] "Assay = Poultry01"
[1] "r2 = 0.998"
[1] "efficiency = 101%"
```



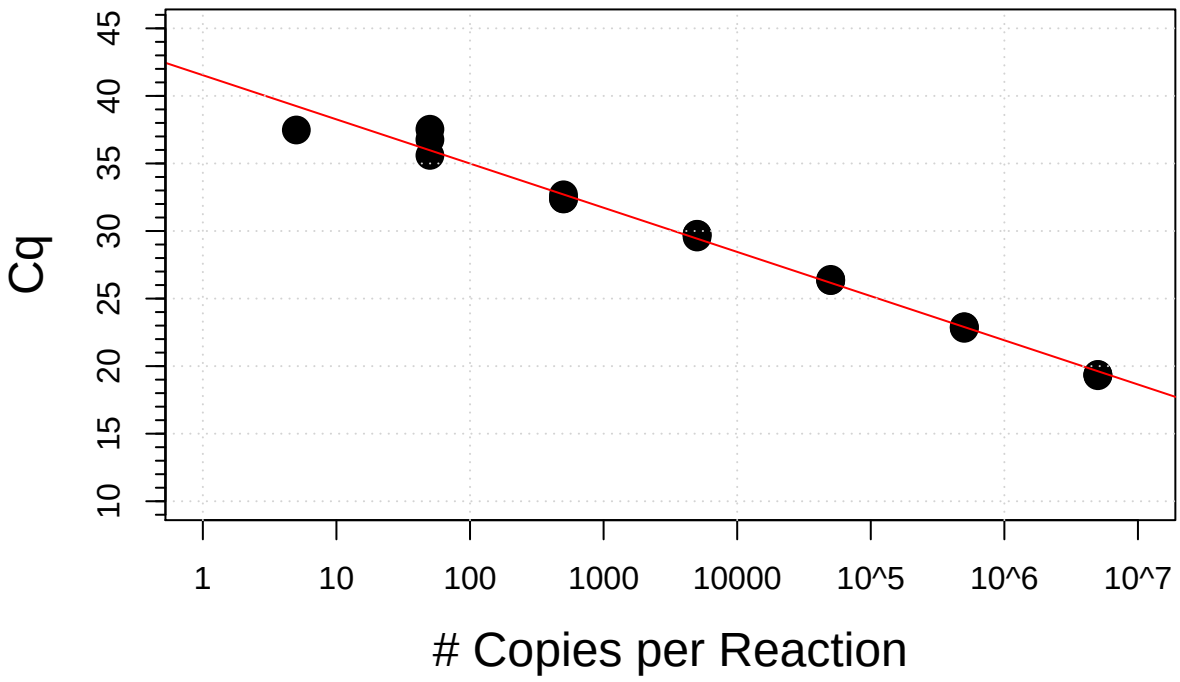

```
[1] "Calibration Curve"
[1] "RunID = JVQ0128"
[1] "Assay = Swine01"
[1] "r2 = 0.99"
[1] "efficiency = 102%"
```



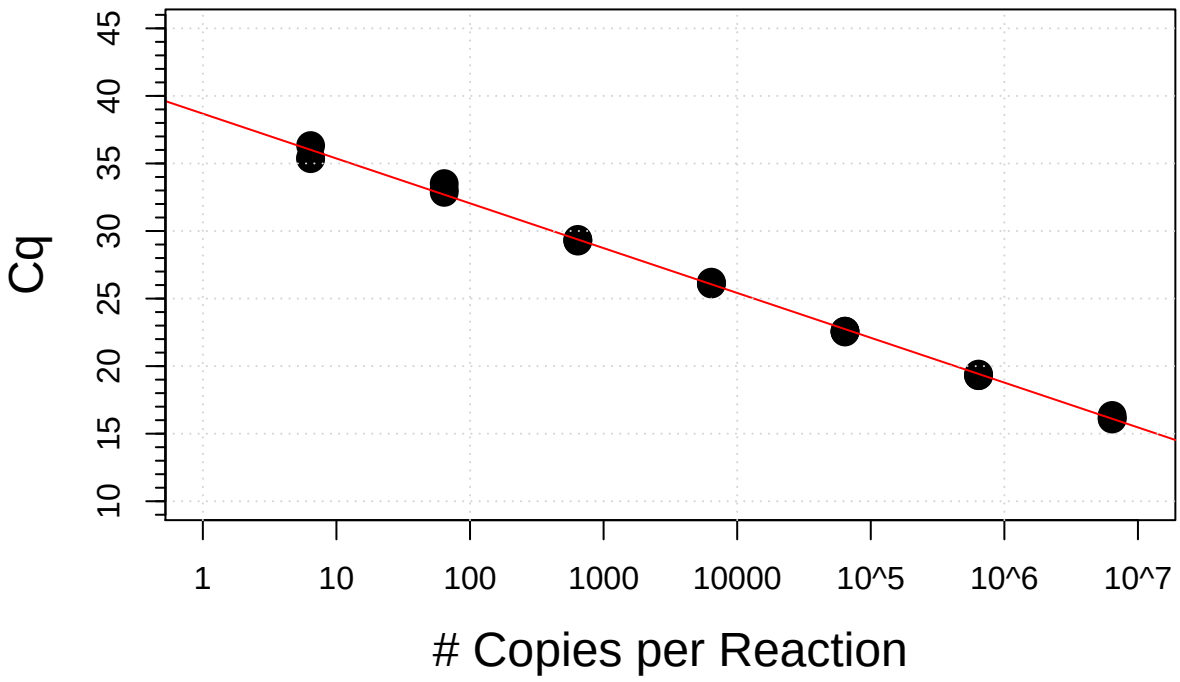

```
[1] "Calibration Curve"
[1] "RunID = JVQ0129"
[1] "Assay = Sheep01"
[1] "r2 = 0.998"
[1] "efficiency = 100%"
```



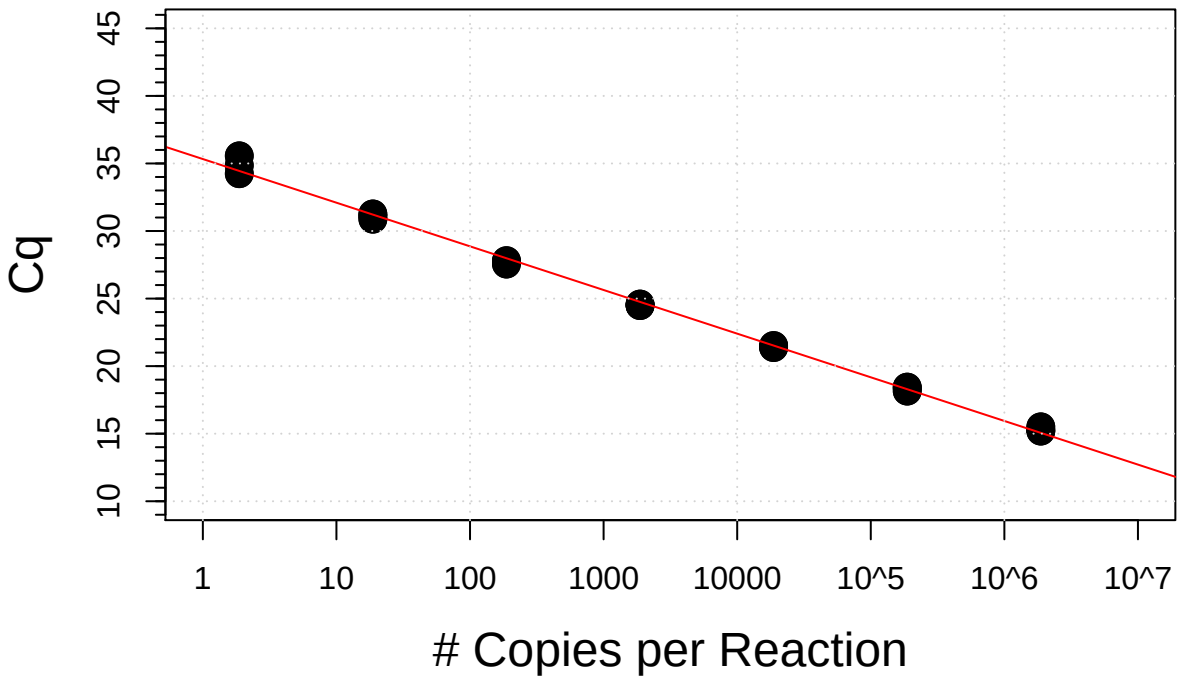

```
[1] "Calibration Curve"
[1] "RunID = JVQ0130"
[1] "Assay = E.coli01"
[1] "r2 = 0.997"
[1] "efficiency = 104%"
```



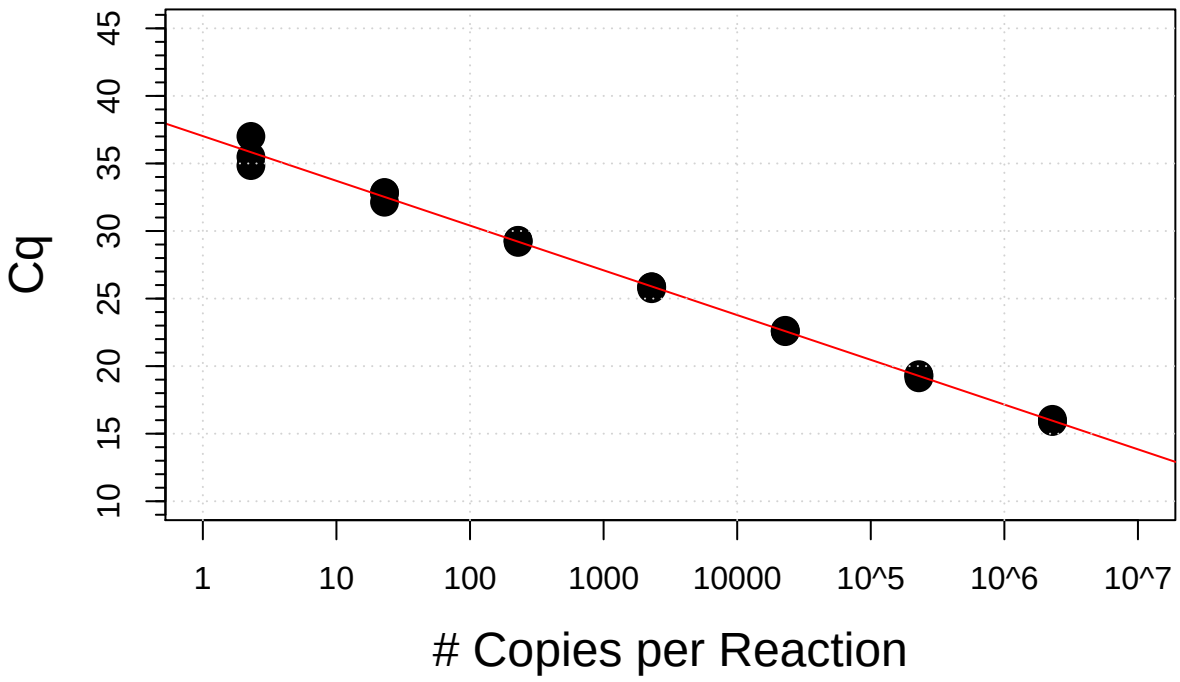

```
[1] "Calibration Curve"
[1] "RunID = JVQ0132"
[1] "Assay = Swine01"
[1] "r2 = 0.99"
[1] "efficiency = 102%"
```



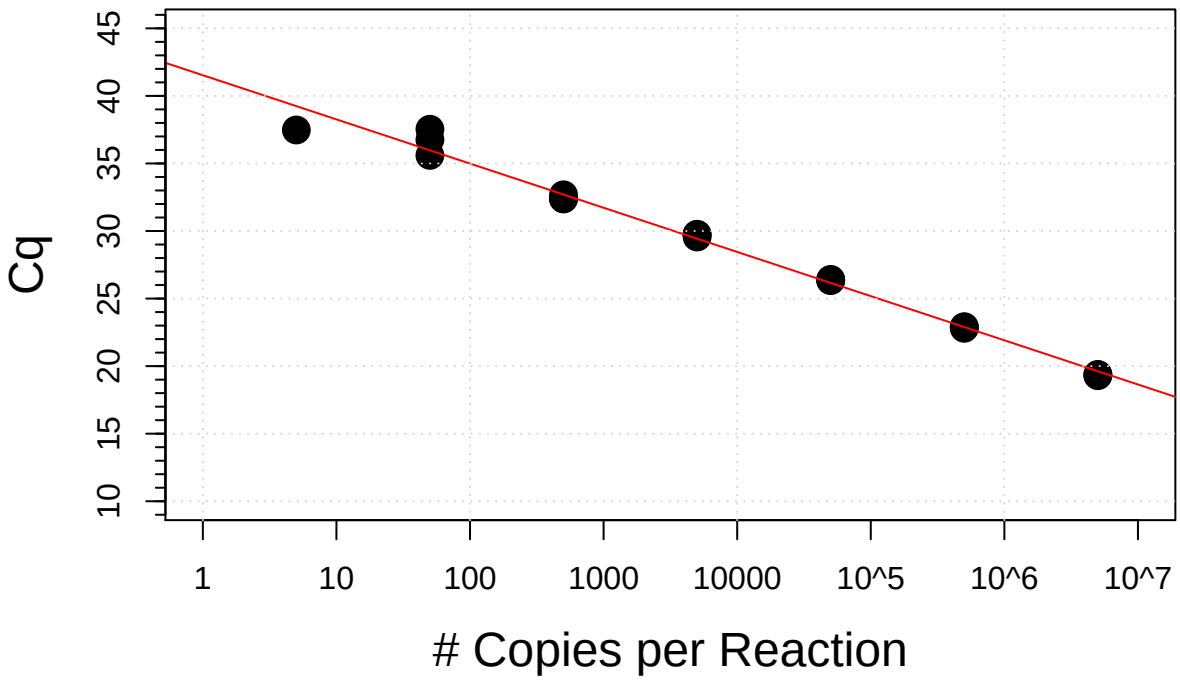

```
[1] "Calibration Curve"
[1] "RunID = JVQ0133"
[1] "Assay = Sheep01"
[1] "r2 = 0.998"
[1] "efficiency = 100%"
```



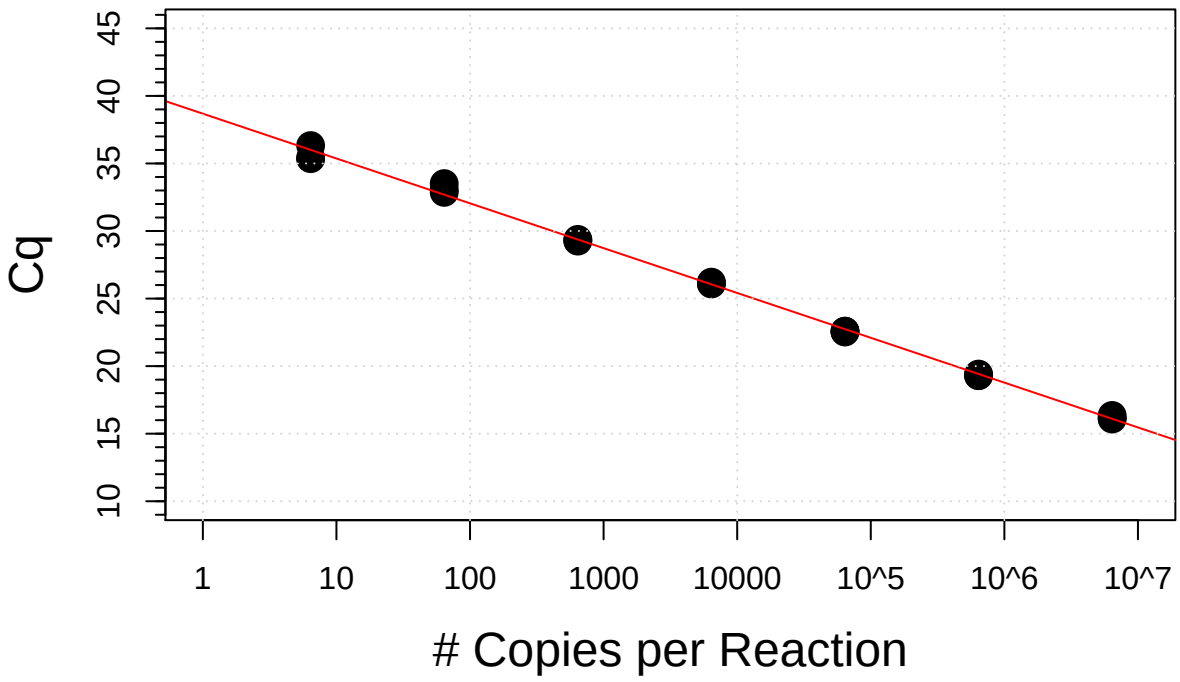

```
[1] "Calibration Curve"
[1] "RunID = JVQ0134"
[1] "Assay = E.coli01"
[1] "r2 = 0.997"
[1] "efficiency = 104%"
```



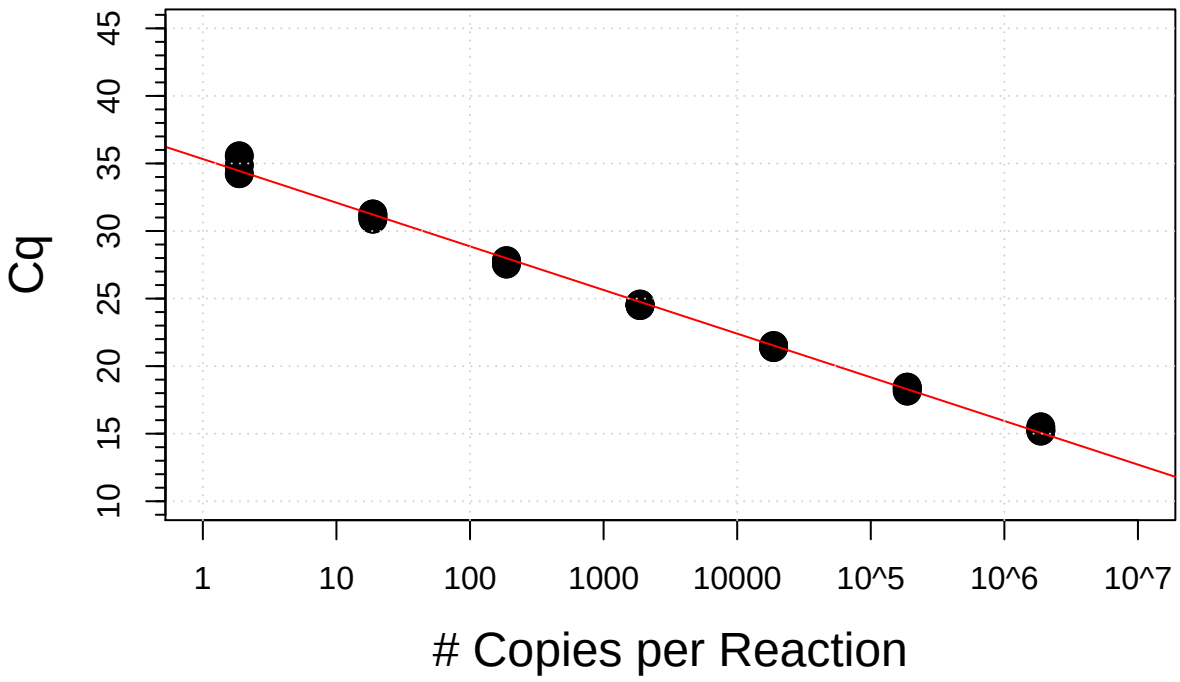

```
[1] "Calibration Curve"
[1] "RunID = JVQ0135"
[1] "Assay = CanadianGoose01"
[1] "r2 = 0.997"
[1] "efficiency = 100%"
```



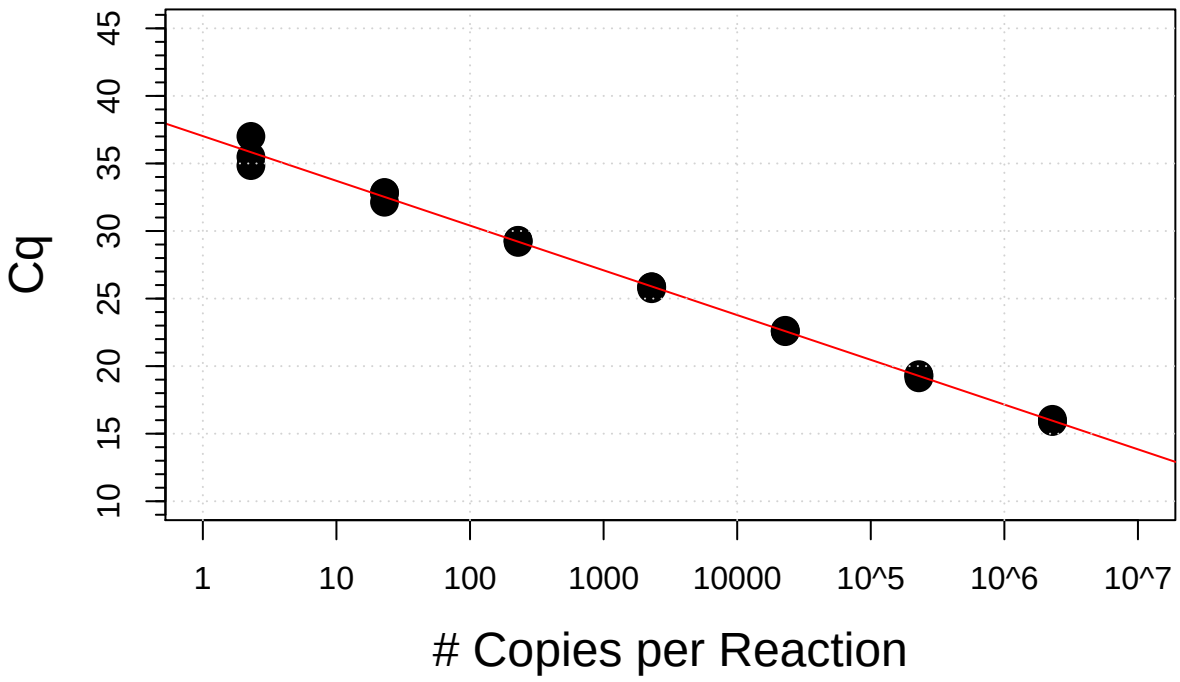

```
[1] "Calibration Curve"
[1] "RunID = JVQ0136"
[1] "Assay = Swine01"
[1] "r2 = 0.99"
[1] "efficiency = 102%"
```



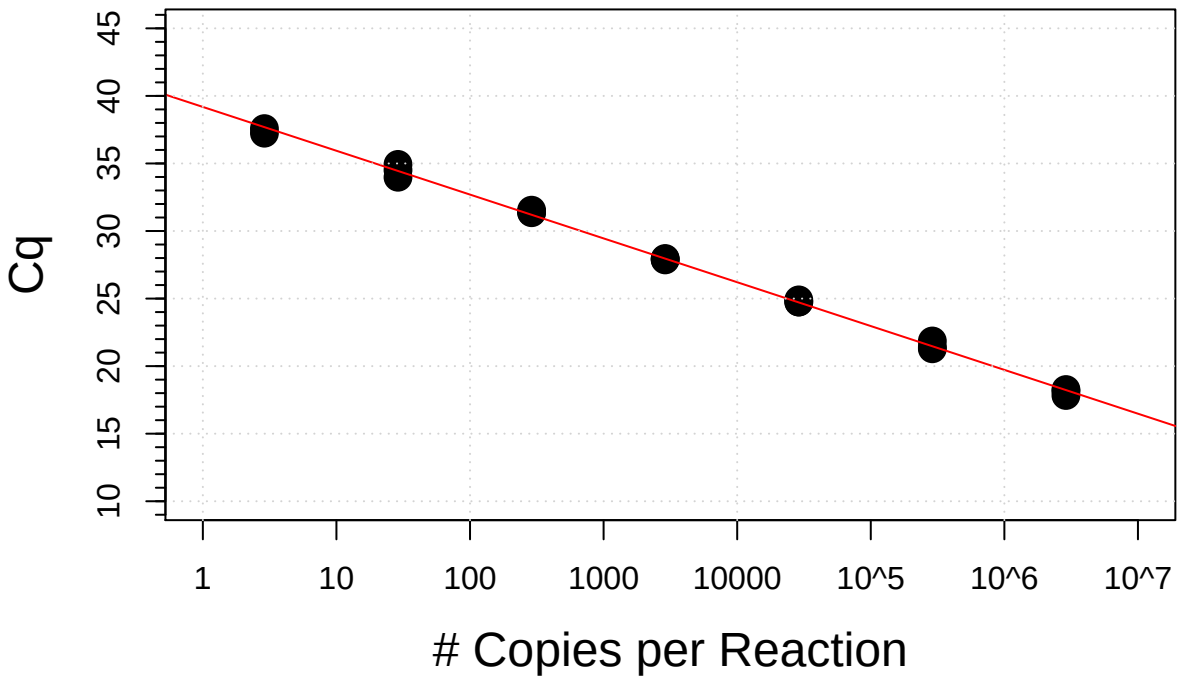

```
[1] "Calibration Curve"
[1] "RunID = JVQ0137"
[1] "Assay = Sheep01"
[1] "r2 = 0.998"
[1] "efficiency = 100%"
```



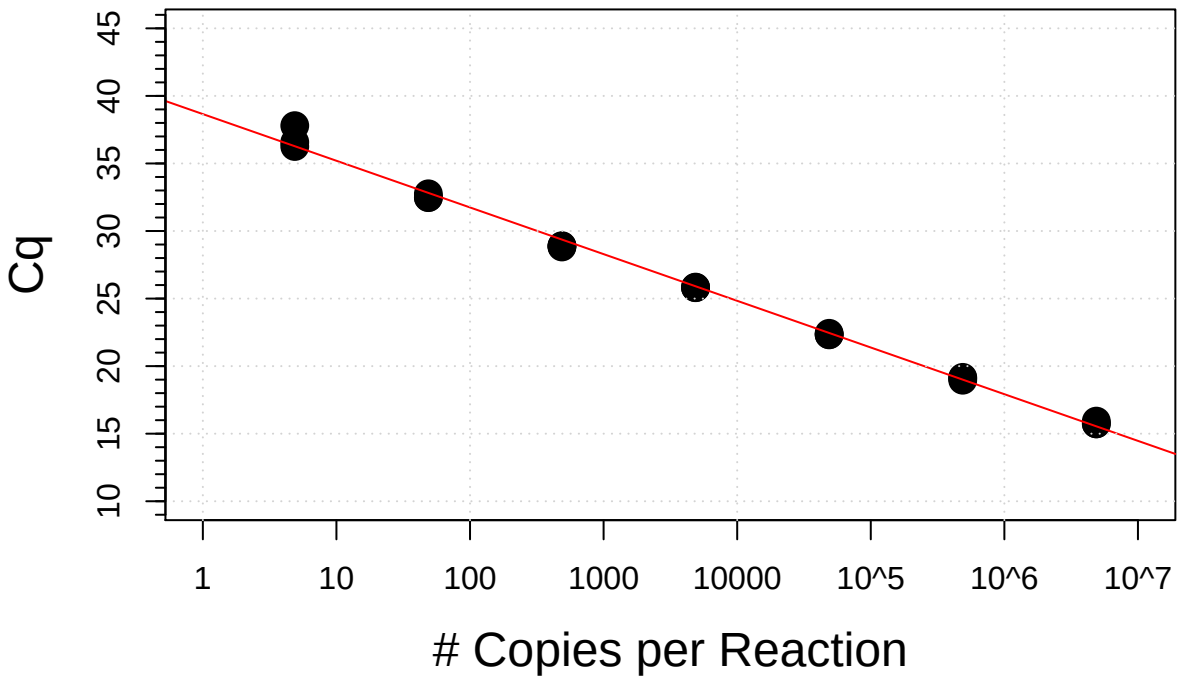

```
[1] "Calibration Curve"
[1] "RunID = JVQ0138"
[1] "Assay = E.coli01"
[1] "r2 = 0.997"
[1] "efficiency = 104%"
```



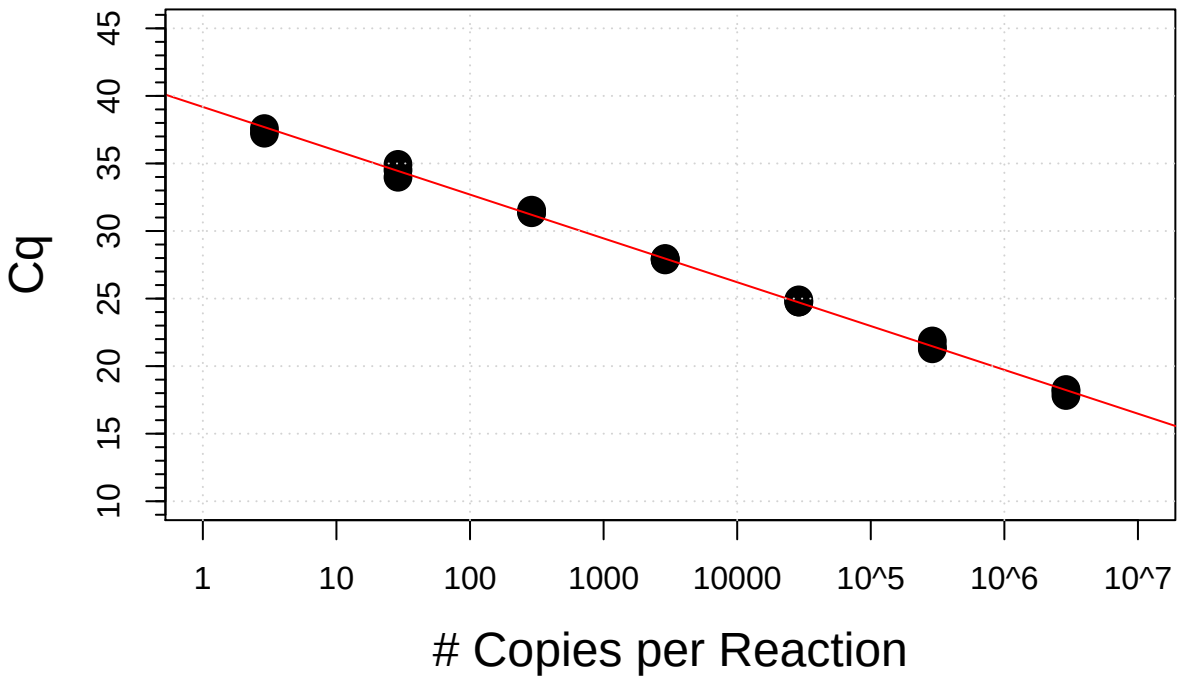

```
[1] "Calibration Curve"
[1] "RunID = JVQ0139"
[1] "Assay = CanadianGoose01"
[1] "r2 = 0.997"
[1] "efficiency = 100%"
```



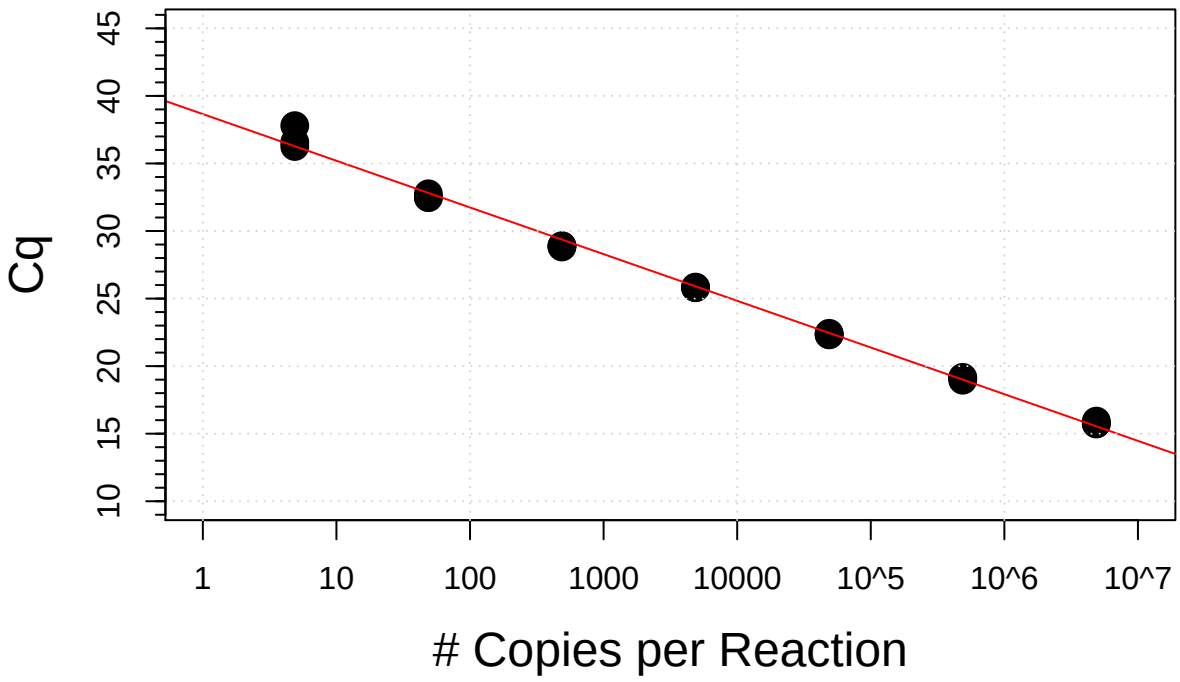

```
[1] "Calibration Curve"
[1] "RunID = JVQ0128"
[1] "Assay = Bovine01"
[1] "r2 = 0.998"
[1] "efficiency = 103%"
```



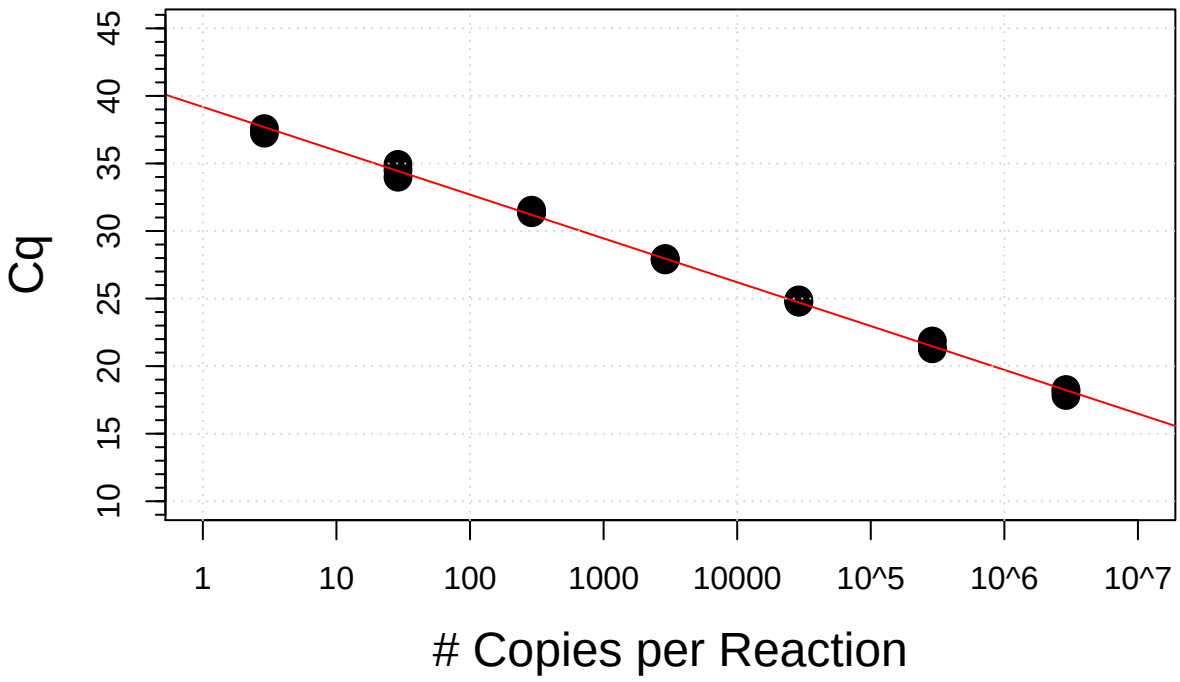

```
[1] "Calibration Curve"
[1] "RunID = JVQ0129"
[1] "Assay = Dog01"
[1] "r2 = 0.996"
[1] "efficiency = 95%"
```



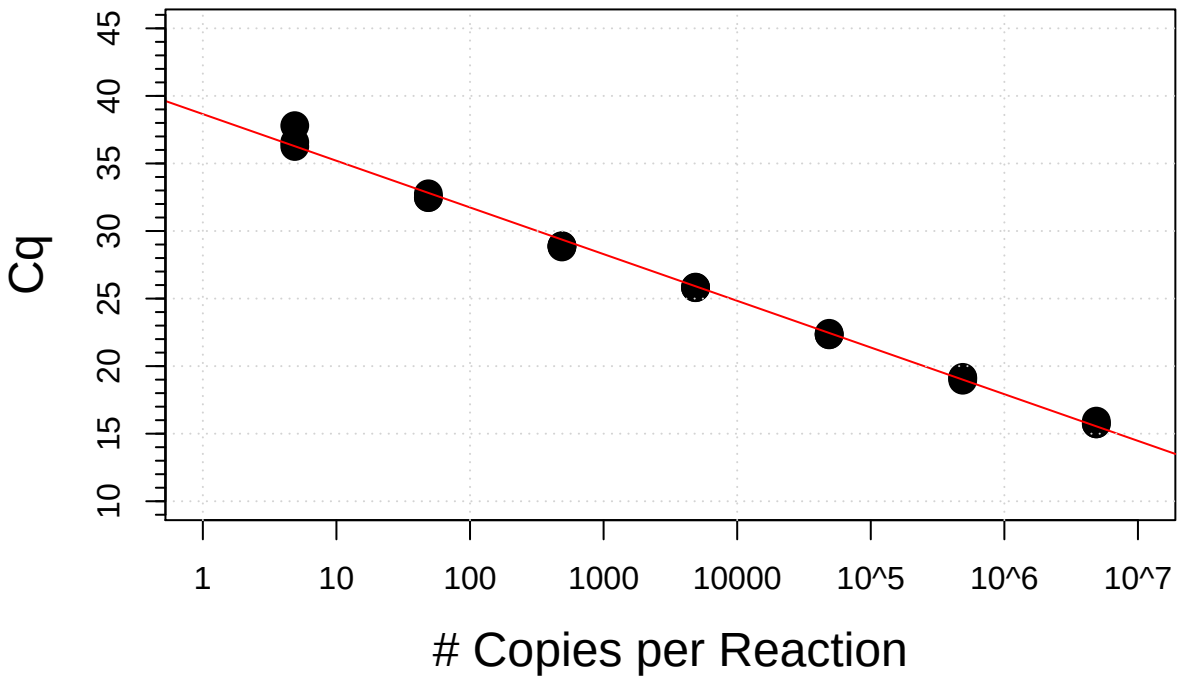

```
[1] "Calibration Curve"
[1] "RunID = JVQ0132"
[1] "Assay = Bovine01"
[1] "r2 = 0.998"
[1] "efficiency = 103%"
```




```
[1] "Calibration Curve"
[1] "RunID = JVQ0133"
[1] "Assay = Dog01"
[1] "r2 = 0.996"
[1] "efficiency = 95%"
```




```
[1] "Calibration Curve"
[1] "RunID = JVQ0136"
[1] "Assay = Bovine01"
[1] "r2 = 0.998"
[1] "efficiency = 103%"
```




```
[1] "Calibration Curve"
[1] "RunID = JVQ0137"
[1] "Assay = Dog01"
[1] "r2 = 0.996"
[1] "efficiency = 95%"
```

## Assays

```
[1] "Assay Name = CanadianGoose01"
[1] "Assay Description = Mitochondrial gene NADH dehydrogenase subunit 2"
[1] "Assay Thermal Profile = 1 cycle at 95 deg C for 5 minutes. 50 cycles at 95 deg"
[2] "C for 15 seconds. 60 deg C for 1 minute"
[1] "Assay Reference = Caldwell, J. M., Levine, J. F. 2009 Domestic wastwater"
[2] "influent profiling using mitochondrial real-time PCR for source tracking animal"
[3] "contamination. Journal of Microbial Methods 17-22."

[1] "Assay Name = Dog01"
[1] "Assay Description = Mitochondrial Cytochrome b"
[1] "Assay Thermal Profile = 1 cycle at 95 deg C for 5 minutes. 50 cycles at 95 deg"
[2] "C for 15 seconds. 60 deg C for 1 minute"
[1] "Assay Reference = Dancer, D., Baker-Austin, C., Lowther, J. A., Hartnell, R."
[2] "E., Lees, D. N., Roberts, L. O. 2014 Development and Integration of"
[3] "Quantitative Real-Time PCR Methods for Detection of Mitochondrial DNA and"
[4] "Methanobrevibacter smithii nifH Gene as Novel Microbial Source Tracking Tools."
[5] "Environmental Fornesics 15:256-264."

[1] "Assay Name = E.coli01"
[1] "Assay Description = uidA Gene"
[1] "Assay Thermal Profile = 1 cycle at 95 deg C for 5 minutes. 50 cycles at 95 deg"
[2] "C for 15 seconds. 60 deg C for 1 minute"
[1] "Assay Reference = Srinivasan, S., et al., Escherichia coli, enterococci, and"
[2] "Bacteroides thetaiotaomicron qPCR signals through wastewater and septage"
[3] "treatment, Water Research (2011), doi:10.1016/j.watres.2011.02.010"

[1] "Assay Name = Human01"
[1] "Assay Description = Mitochondrial gene NADH dehydrogenase subunit 5"
[1] "Assay Thermal Profile = 1 cycle at 95 deg C for 5 minutes. 50 cycles at 95 deg"
[2] "C for 15 seconds. 60 deg C for 1 minute"
[1] "Assay Reference = Caldwell, J. M., Raley, M. E., and Levine, J. F. 2007"
[2] "Mitochondrial multiplex real-time PCR as a source tracking method in"
[3] "fecal-contaminated effluents. Environmental Science and Technology"
[4] "41:3277-3283."

[1] "Assay Name = Poultry01"
[1] "Assay Description = Mitochondrial Cytochrome b"
[1] "Assay Thermal Profile = 1 cycle at 95 deg C for 5 minutes. 50 cycles at 95 deg"
[2] "C for 15 seconds. 60 deg C for 1 minute"
[1] "Assay Reference = Dancer, D., Baker-Austin, C., Lowther, J. A., Hartnell, R."
[2] "E., Lees, D. N., Roberts, L. O. 2014 Development and Integration of"
[3] "Quantitative Real-Time PCR Methods for Detection of Mitochondrial DNA and"
[4] "Methanobrevibacter smithii nifH Gene as Novel Microbial Source Tracking Tools."
[5] "Environmental Fornesics 15:256-264."
```