Number of Resistances and Simple Plots

16.04.2022

Bibliotheken laden, Hilfsfunktion

```
library(ggplot2)     # moderne plots

debug <- T           # debug printout
debug <- F           # kein debug printout
Log <- function(string) {
  if(debug){print(string)}
}
```

MY Schicht Festlegen

Nur die letzte Zeile zählt!

```
Schicht <- "GT8000"    # Greater Than 8000
Schicht <- "LE8000"    # Less than or Equal to 8000
Schicht <- "U"         # Un-stratisfied
```

Resistenzen.Rmd erzeu Resistengtezen[Schicht].csv, das einlesen

Und evtl. ansehen

```
FileIn <- paste( "Resistenzen",Schicht,".csv" , sep="" )  # Fileout ist nur N davorgehängt
Resistenzen <- read.csv(FileIn)

# csv schreiben fügt vorne Index-Spalte an; diese entfernen :
Resistenzen[,1] <- NULL

if(debug){View(Resistenzen)}
```

Resistenzen pro Betrieb

Resistenzen pro Betrieb in neuer Tabelle "NResistenzen" zählen, Multirestenz dokumentieren und als NResistenzen.csv ausschreiben

```
ResRow  <- nrow(Resistenzen)  # Zeilen Resistenzen : 4 pro Betrieb
NResRow <- ResRow/4           # Zeilen NResistenzen : 1 pro Betrieb

maxcol <- match("WM.group",names(Resistenzen)) - 1
#NAntib  <- 15                 # wir untersuchen 15 Antibiotika (wird von Resistenzen.Rmd so aus 2 Excel files ein

NResistenzen <- Resistenzen[0,]                          # header wie"Resistenzen"
for(line in 1:NResRow){                                  # 1 bis 60, aber 30 fehlt
  i <- (line - 1)*4 + 1
  NResistenzen[line,] <- Resistenzen[(line - 1)*4 + 1,]  # WM.group etc. kopieren
  NResistenzen[line,2:maxcol] <- 0                       # aber Antibiotika auf 0 setzen : hier später Resistenzen
}
for(col in 2:maxcol){
  NResistenzen[,col] <-  as.numeric(NResistenzen[,col])  # muss immer noch in type double konvertieren
}
```

```
if(debug){View(NResistenzen)}

# für jedes Antibiotikum Resistenzen über die 4 Proben zählen, also mögliche Werte 0-4 :
for(i in 1:ResRow){                             # Liniennummer (Betriebe in 4er Gruppen) für dataframe Resistenzen
  Log(paste("i=",i))

  line <- floor((i-1)/4)+1                      # Liniennummer für dataframe NResistenzen

  for(j in 2:maxcol){                           # Spaltennummer: Antibiotikum
    if(substr(Resistenzen[i,j],1,1)==">"){      # wenn Resistenz
      Log(paste("  NResistenzen[",line,j,"]=",NResistenzen[line,j],typeof(NResistenzen[line,j]) ))
      NResistenzen[line,j] <- NResistenzen[line,j] + 1  # gef. Resistenz zählen
} } }

NResistenzen$NRes   <- rep(0,NResRow)  # neue Spalte, zählt für jeden Betrieb Resistenzen über Antibiotika; erstma
NResistenzen$MultiR <- rep(F,NResRow)  # neue Spalte, dokumentiert für jeden Betrieb Multiresistenz; erstmal False

print(paste("maxcol =",maxcol))
```

```
## [1] "maxcol = 16"
```

```
for(line in 1:NResRow){                 # 1 bis 60, aber 30 fehlt
  for(col in 2:(maxcol)){
    if(NResistenzen[line,col] > 0){
      NResistenzen[line,"NRes"] <- NResistenzen[line,"NRes"]+1  # Resistenz zählen
    }
  }
  if(NResistenzen[line,"NRes"] >= 3){  # Multiresistenz heisst mind. 3 Resistenzen
    NResistenzen[line,"MultiR"] <- T
  }
}
if(debug){View(NResistenzen)}
write.csv(NResistenzen, paste( "N", FileIn , sep="" ))
```

Funktion für die Grafik

```
graphisch2 <- function(gruppe, join, antibiotikum) {
  group <- Resistenzen[,gruppe ]
  antib      <- Resistenzen[,antibiotikum ]
  dir.create(paste("plots_",Schicht,sep=""))             # directory for writing the plots

  X <- c()
  Y <- c()
  for(i in 1:ResRow){                       # Liniennummer für dataframe Resistenzen
    x <- as.numeric(group[i])               # [,na.rm=TRUE) hilft nicht weil's "NA" ist, nicht NA]
    if(substr(antib[i],1,1) == ">"){        # wenn Resistenz

      pos <- match(x,X)
      if(is.na(pos)){
        X <- c(X,x)    # faster: pre-allocate+assign,
        Y <- c(Y,1)    # in this way vector copied in every iteration
      } else {
        Y[pos] <- Y[pos] + 1
      }
    }
  }

  df <- data.frame(X,Y)
  ylab <- paste(antibiotikum,"- Resistances")

  if( gruppe == "WM.group" ){xlab <- "Wastemilk Group"}
```

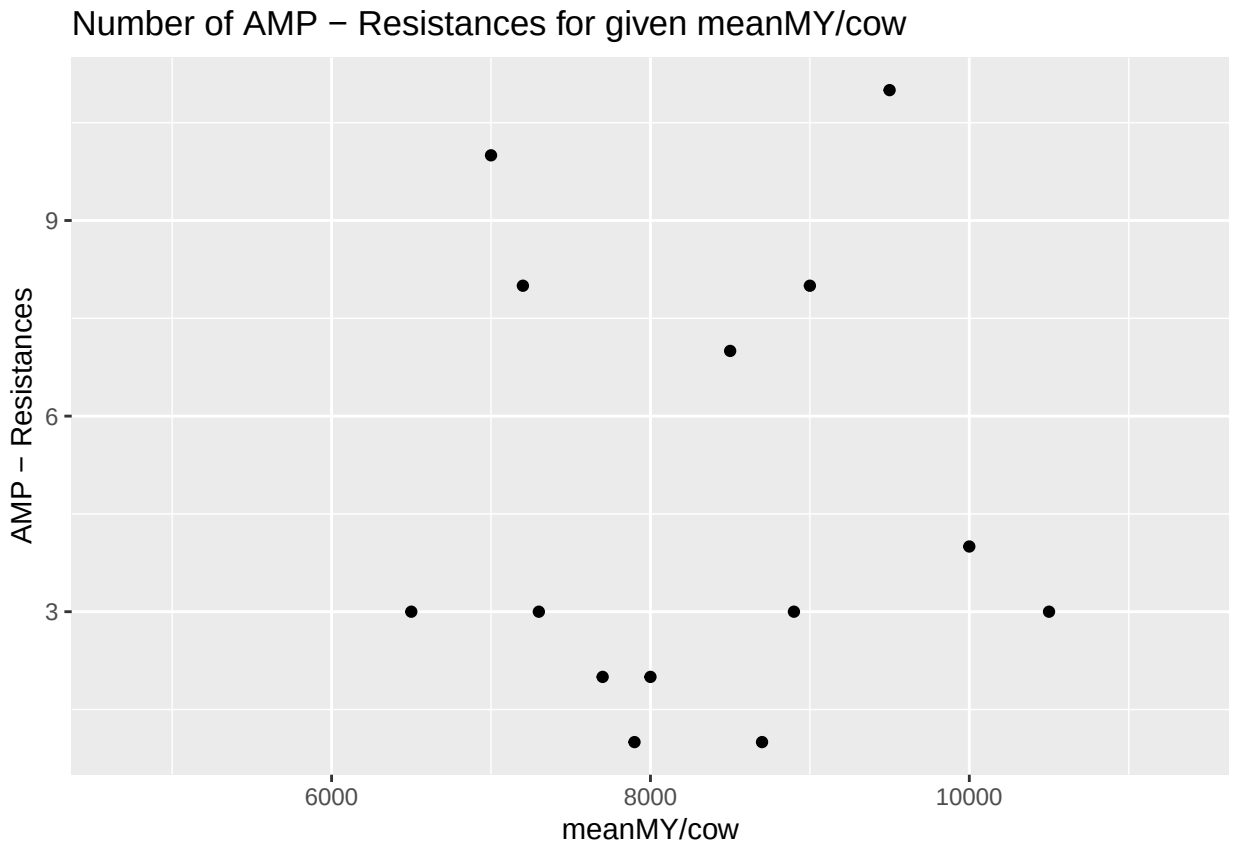
```
  if( gruppe == "OLS.group"){xlab <- "Other LiveStock Group"}
  if( gruppe == "IAC.group"){xlab <- "Ill Animals in Calving Box Group"}
  ### Neue binäre hier dazufügen ###

  if( gruppe == "HSC.group"){xlab <- "Husbandry System Calves Group"}
  ### Neue nominale hier dazufügen ###

  if( gruppe == "MY"       ){xlab <- "meanMY/cow"}
  if( gruppe == "SCC"      ){xlab <- "mean SCC/11mo"}
  if( gruppe == "CBC"      ){xlab <- "calvingbox_clean"}
  if( gruppe == "DIA"      ){xlab <- "IN_diarrhea<30d"}
  ### Neue numerische hier dazufügen ###

  min <- min(as.numeric(Resistenzen[,gruppe]), na.rm=T)
  max <- max(as.numeric(Resistenzen[,gruppe]), na.rm=T)

  puffer <- (max - min)/20
  min <- min - puffer       # links und rechts 5% freier Platz
  max <- max + puffer

  print( ggplot(df, aes(X, Y)) +
    geom_point() +
    xlim(min,max) +
    xlab(xlab) + ylab(ylab)  +
    ggtitle(paste("Number of", ylab, join,xlab))
  )
  ggsave(paste("plots_",Schicht,"/", Schicht,"_",gruppe,"_",antibiotikum,".png", sep=""))
}
```

Plot Anzahl der Resistenzen für verschiedene Antibiotika, numerische Variablen

- MERO, AMI, TGC, TAZ COL, keine Resistenzen
- FOT , AZI nur eine (die AZI-CBC und AZI-IAC plots sind korrekterweise leer: Diese Resistenz hat NA für CBC und IAC)

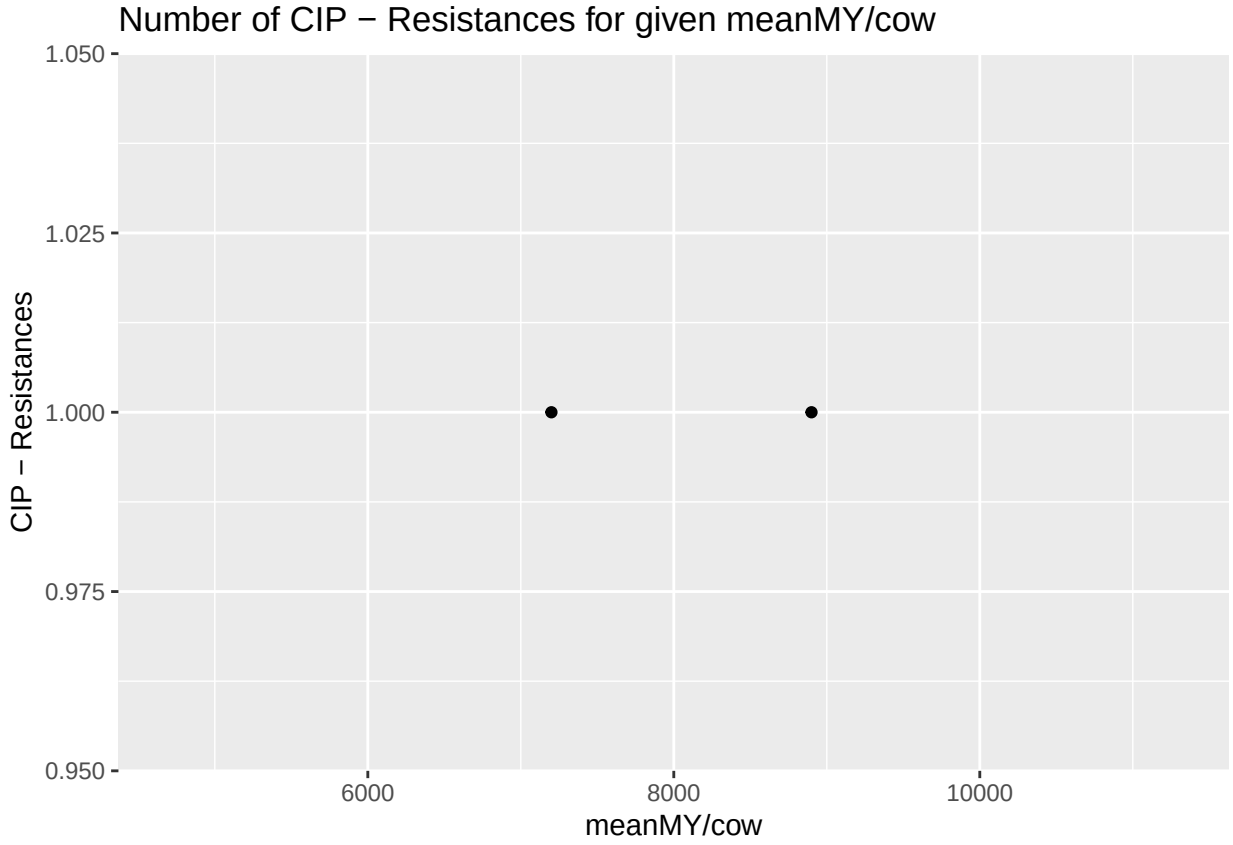
```
#   NA warnings interessieren nicht

numerisch <- c("MY","SCC","CBC","DIA")     # untersuchte numerische Variablen  ### neue numerische hier hinzufügen
for( group in numerisch) {

  for( antib in c("AMP","CIP","AZI","GEN","FOT","CHL","NAL","TET","TMP","SMX") ){

    graphisch2(group,"for given",antib)
    print("")
  }
  print("------------------------------------------------------------")
}
```

```
## Saving 6.5 x 4.5 in image
```




```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```




```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
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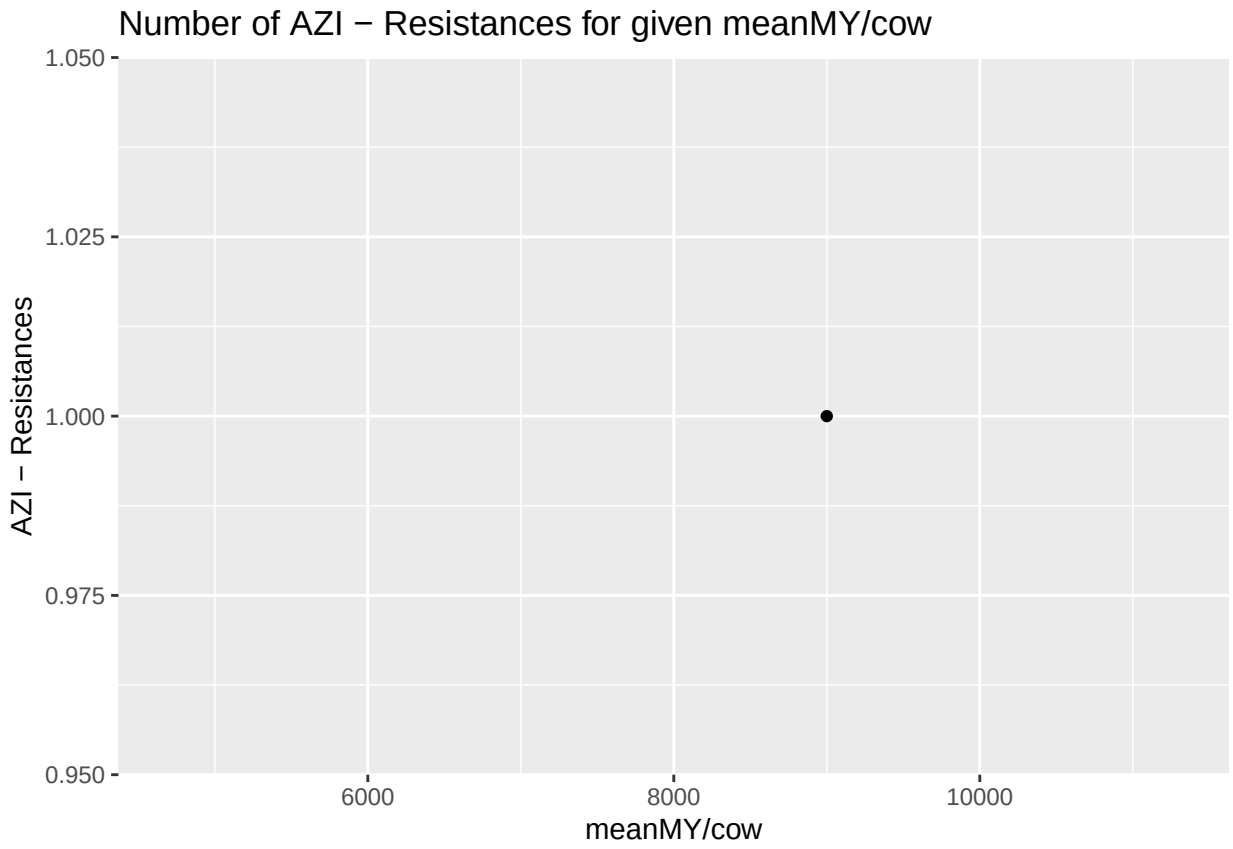
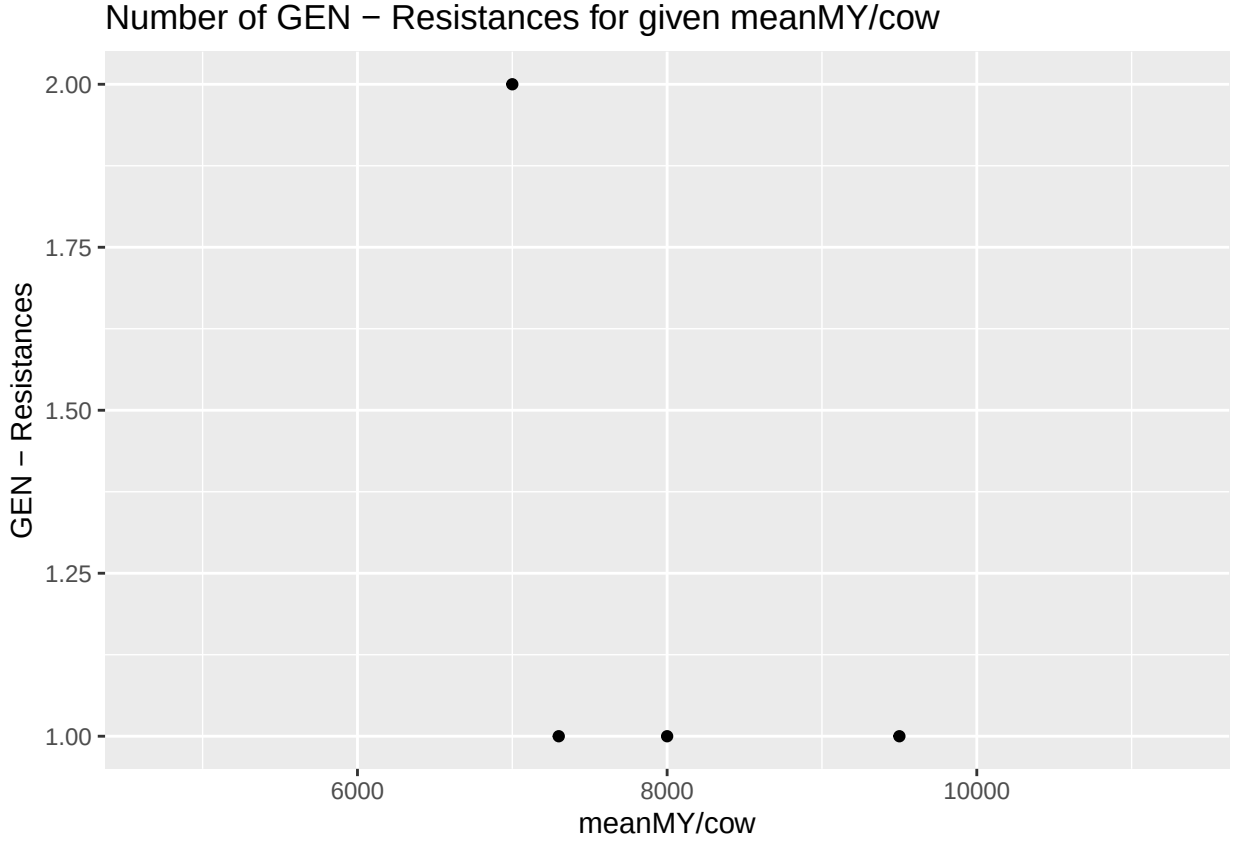



```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```

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## [1] ""
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```
## Saving 6.5 x 4.5 in image
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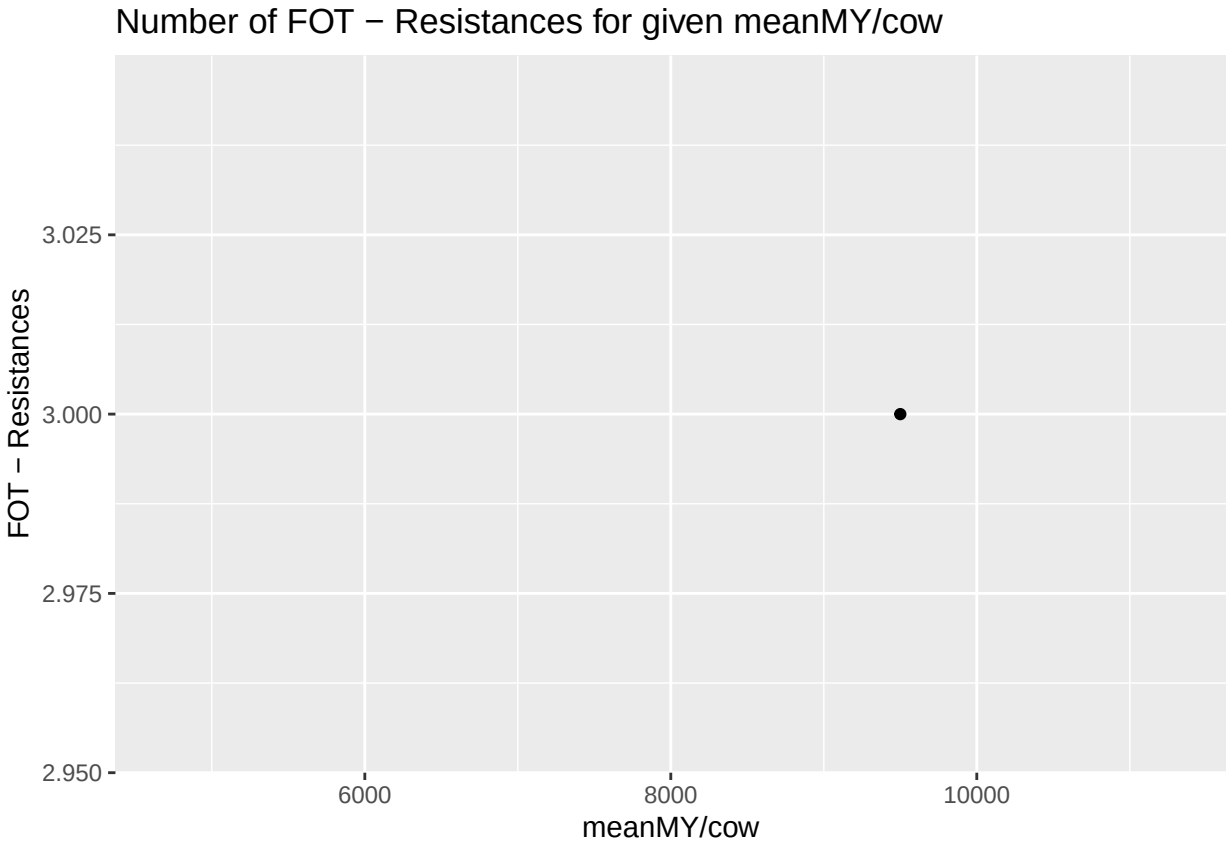


```
## [1] ""
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## Saving 6.5 x 4.5 in image
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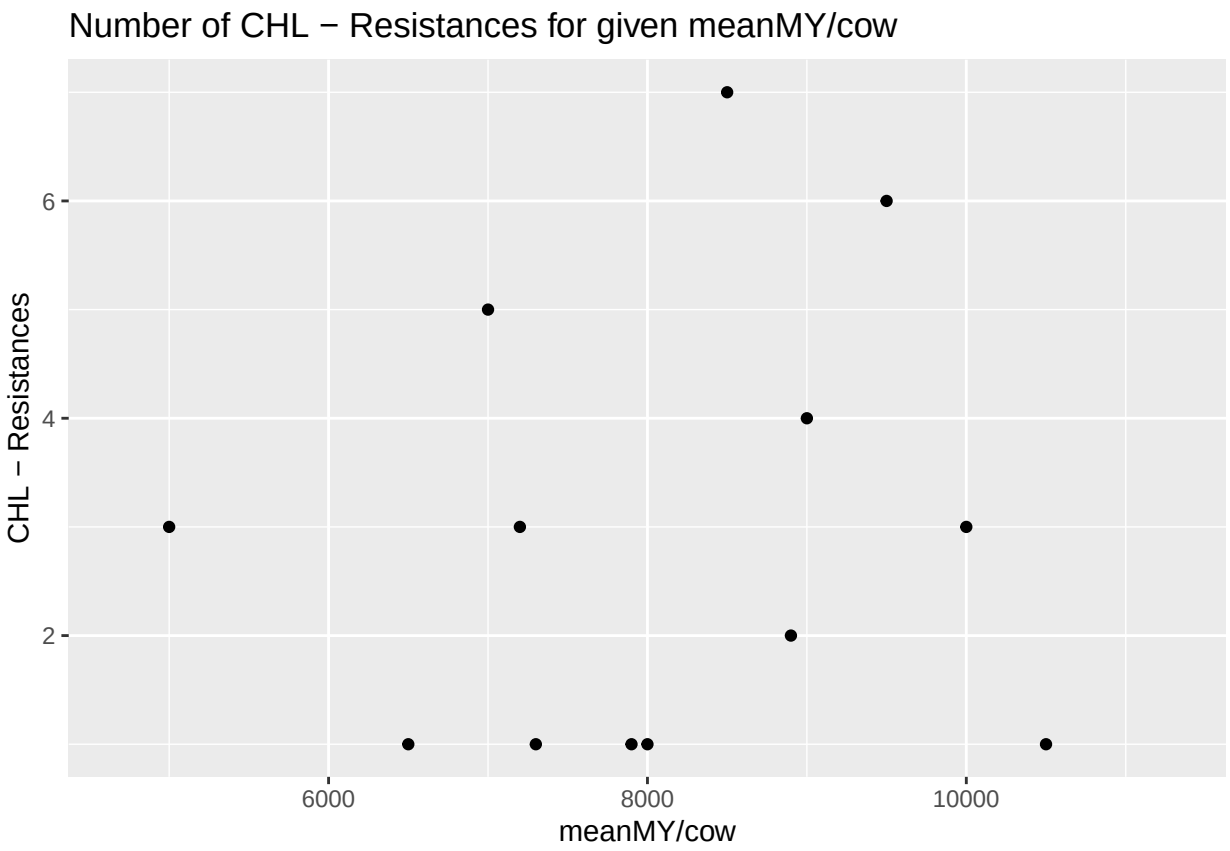


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## [1] ""
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```
## Saving 6.5 x 4.5 in image
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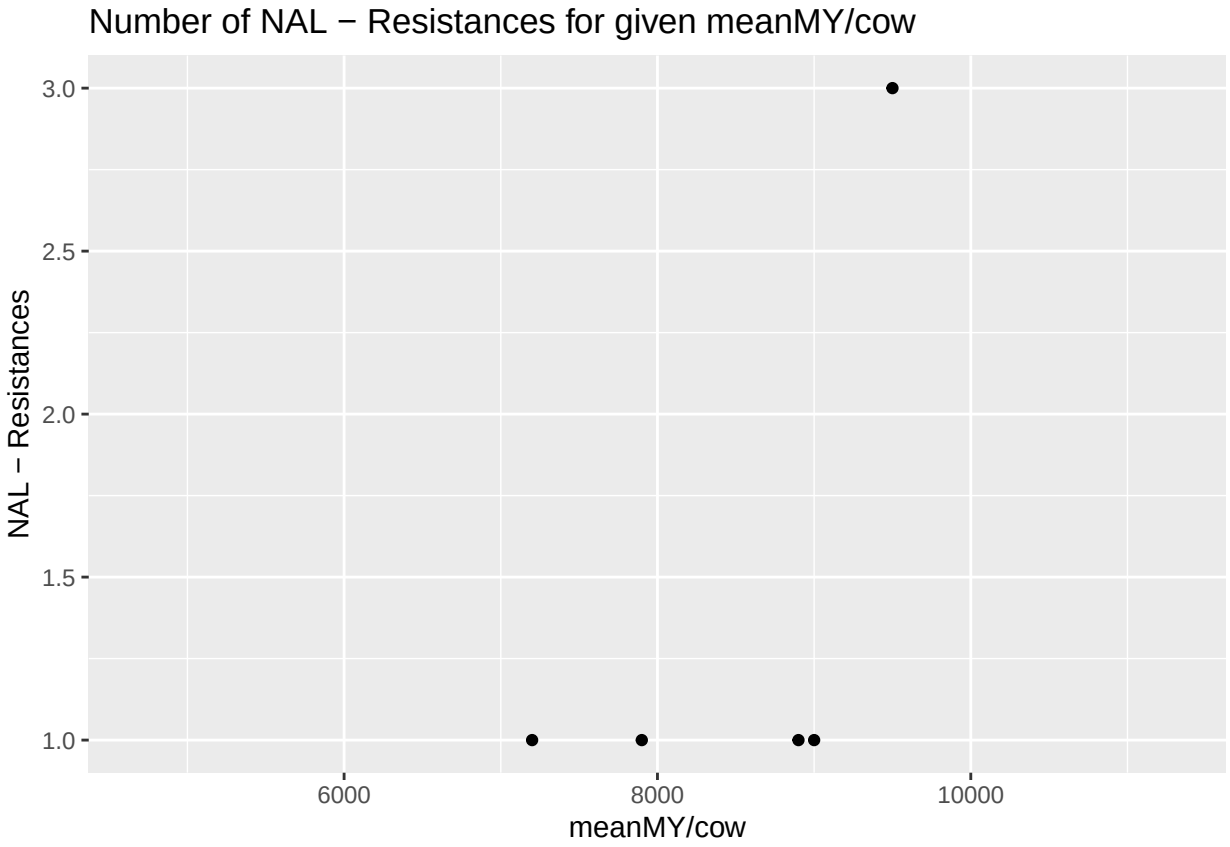


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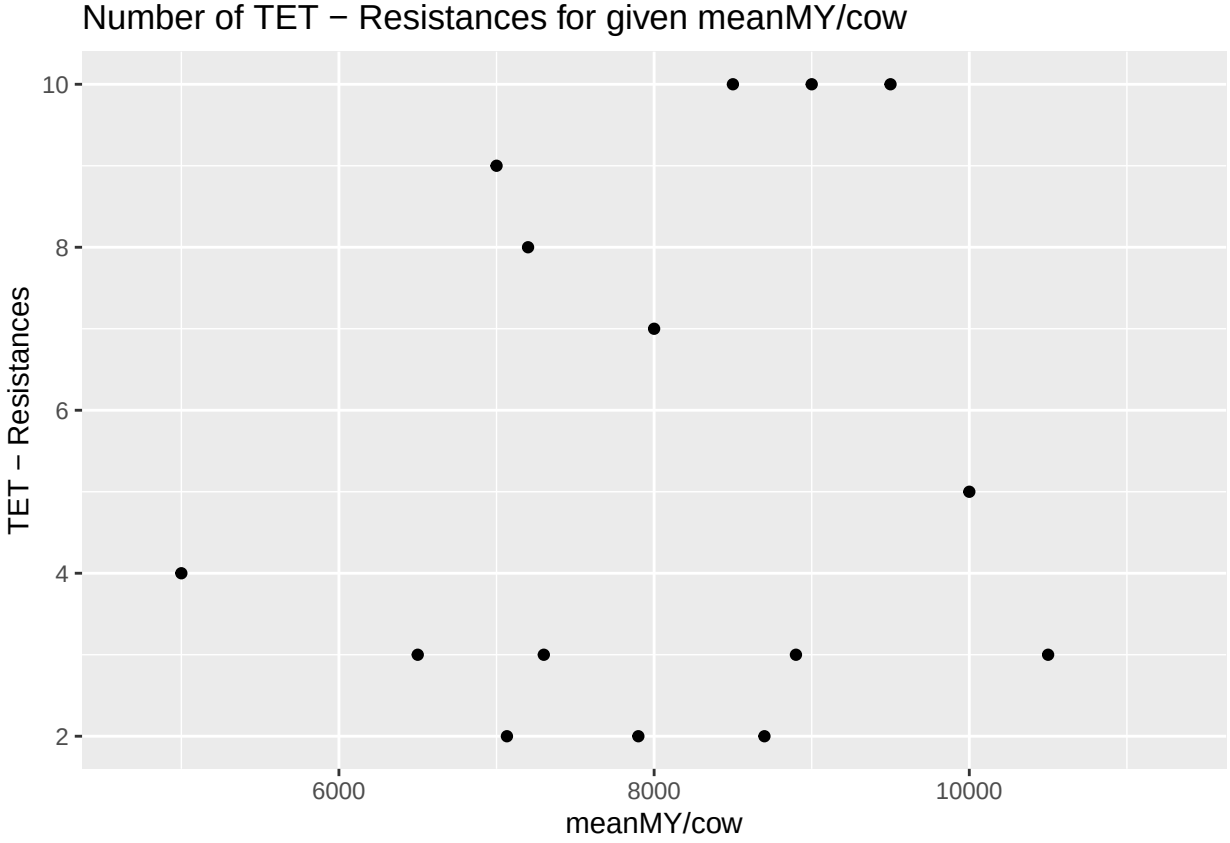
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```




```
## [1] ""
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```
## Saving 6.5 x 4.5 in image
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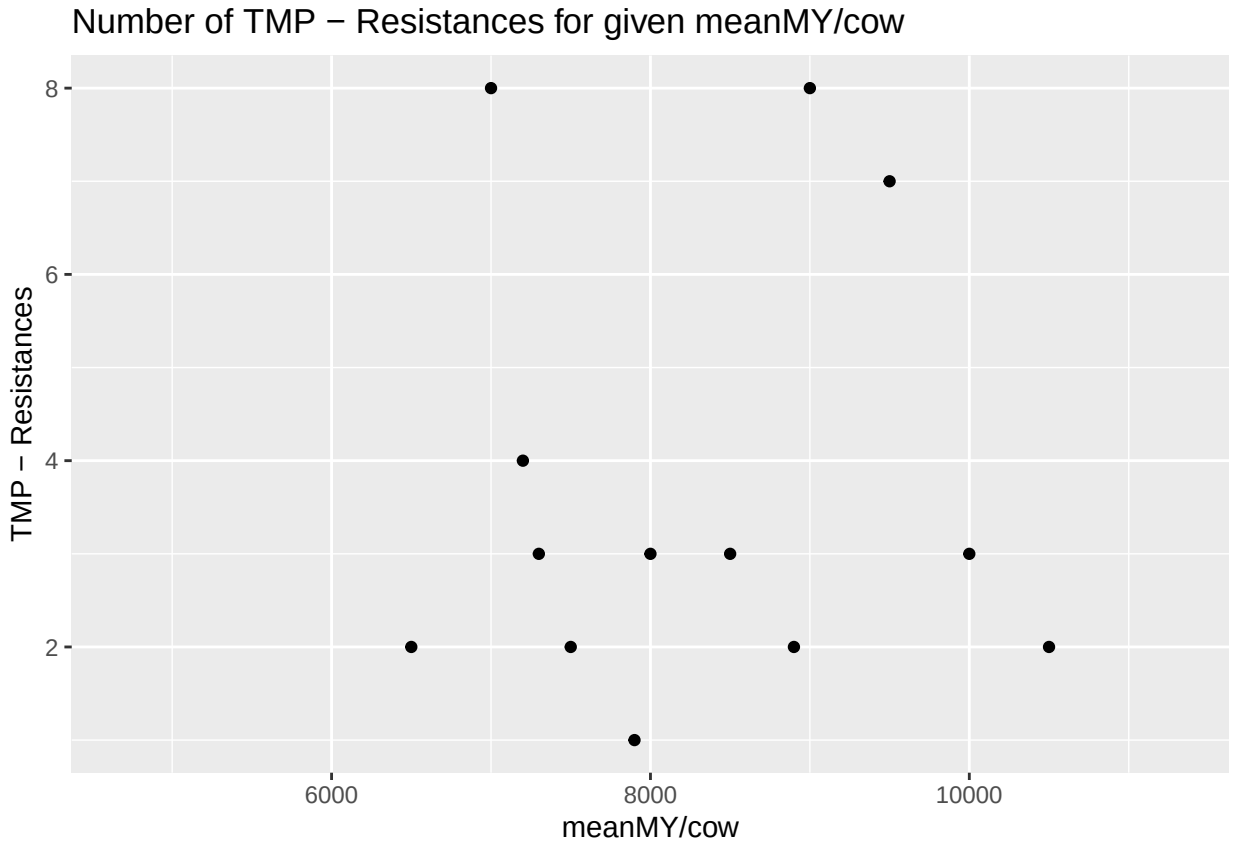


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## [1] ""
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```
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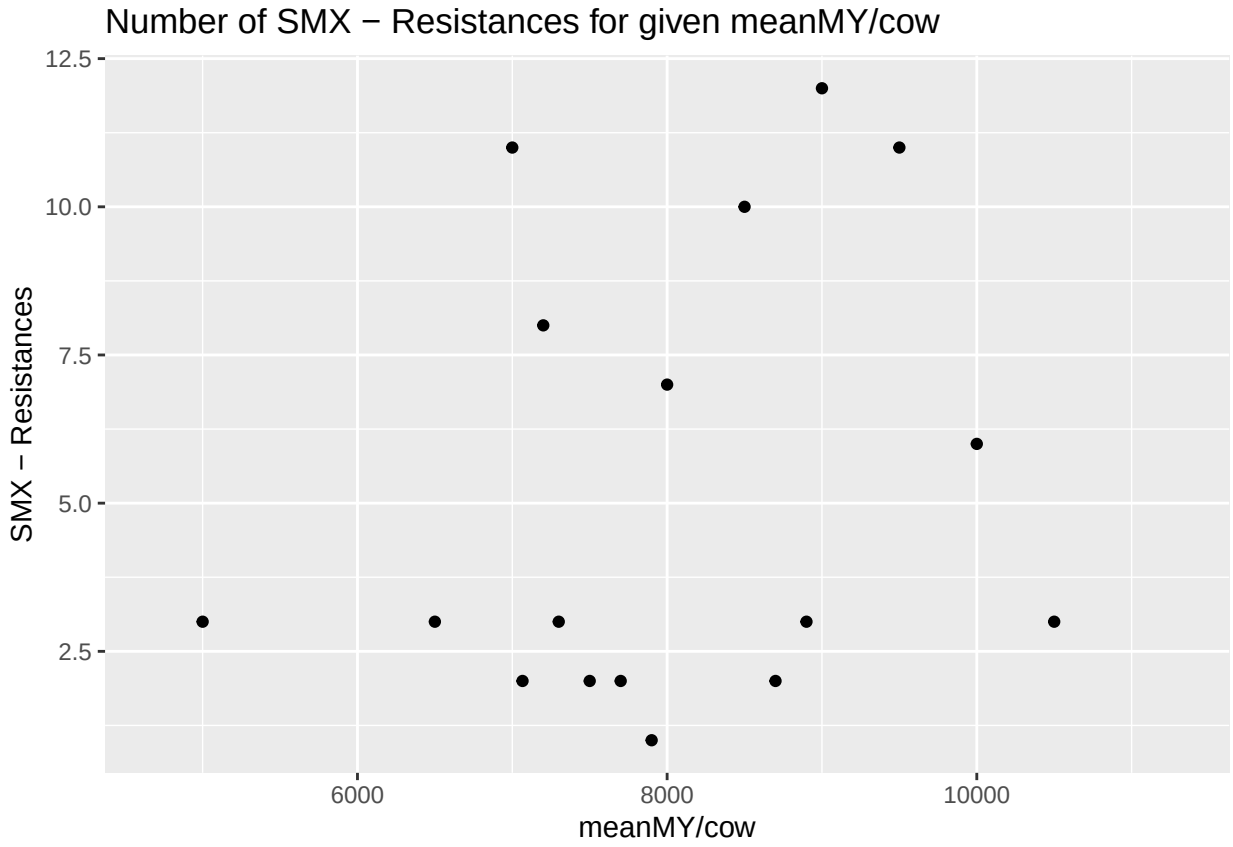


```
## [1] ""
## [1] "------------------------------------------------------------"
```

```
## Saving 6.5 x 4.5 in image
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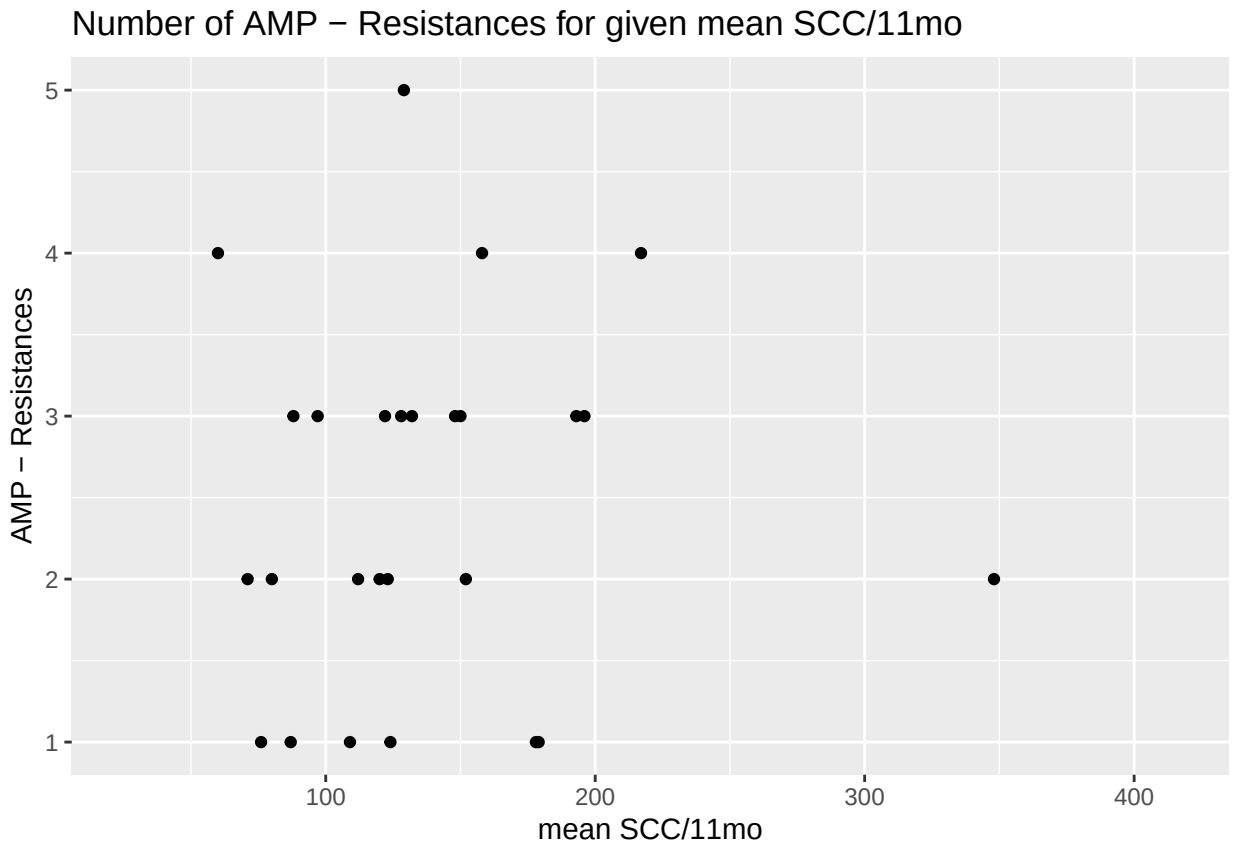


```
## [1] ""
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```
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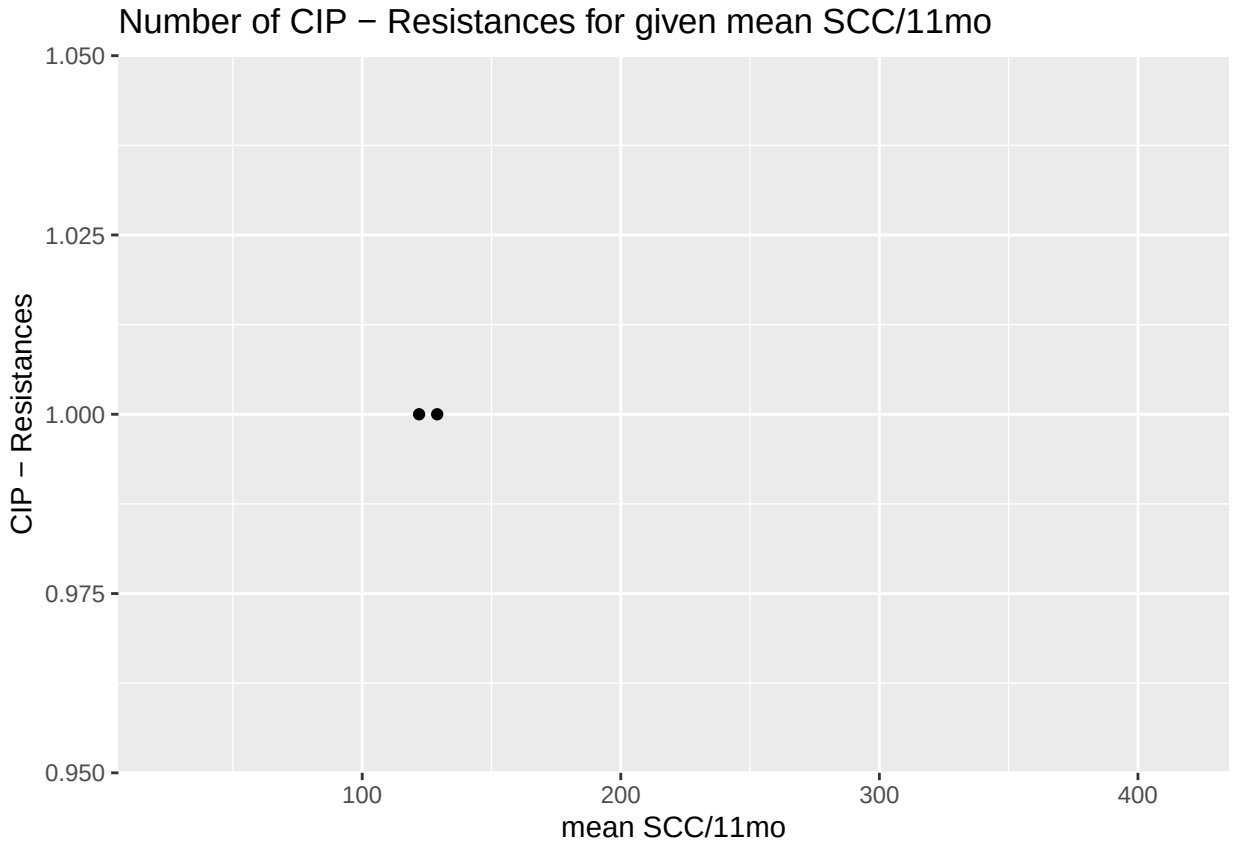


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## [1] ""
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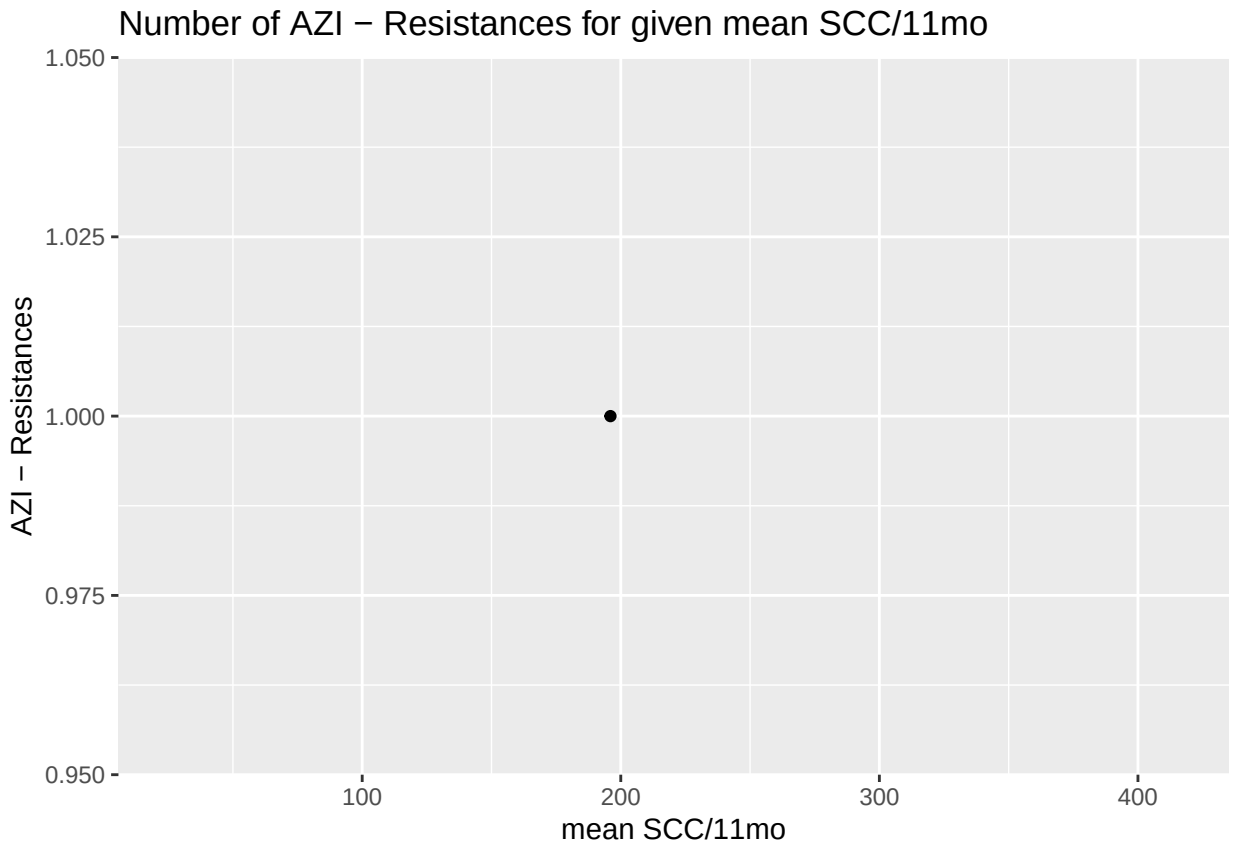


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## [1] ""
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## Saving 6.5 x 4.5 in image
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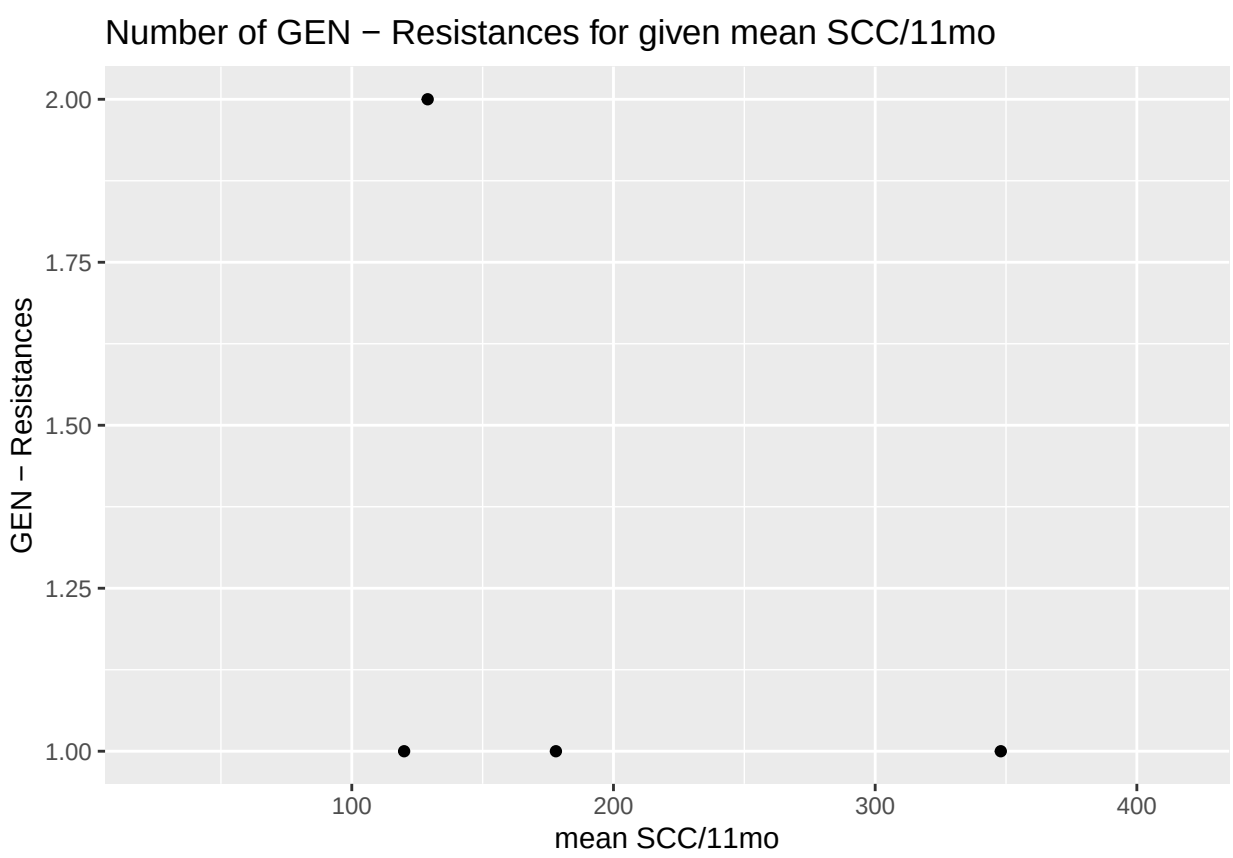


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## [1] ""
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```
## Saving 6.5 x 4.5 in image
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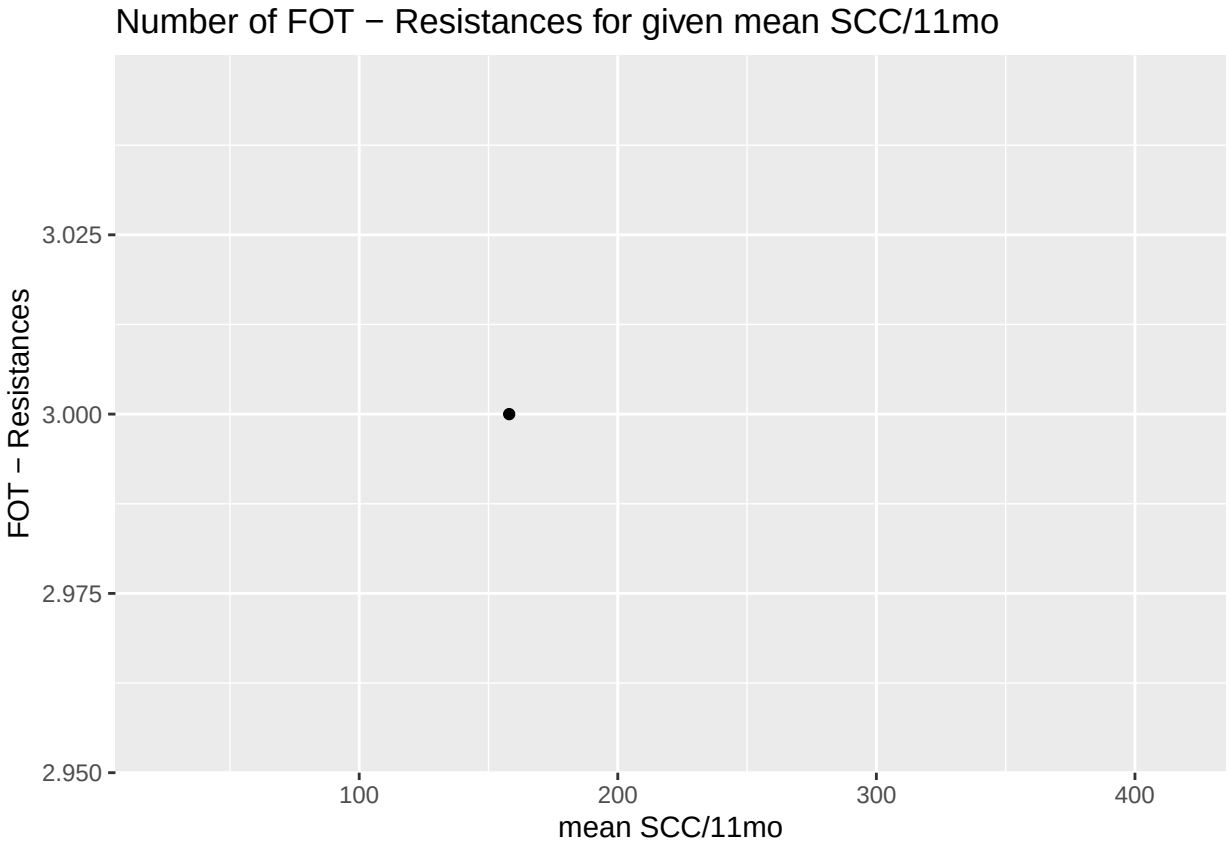


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## [1] ""
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```
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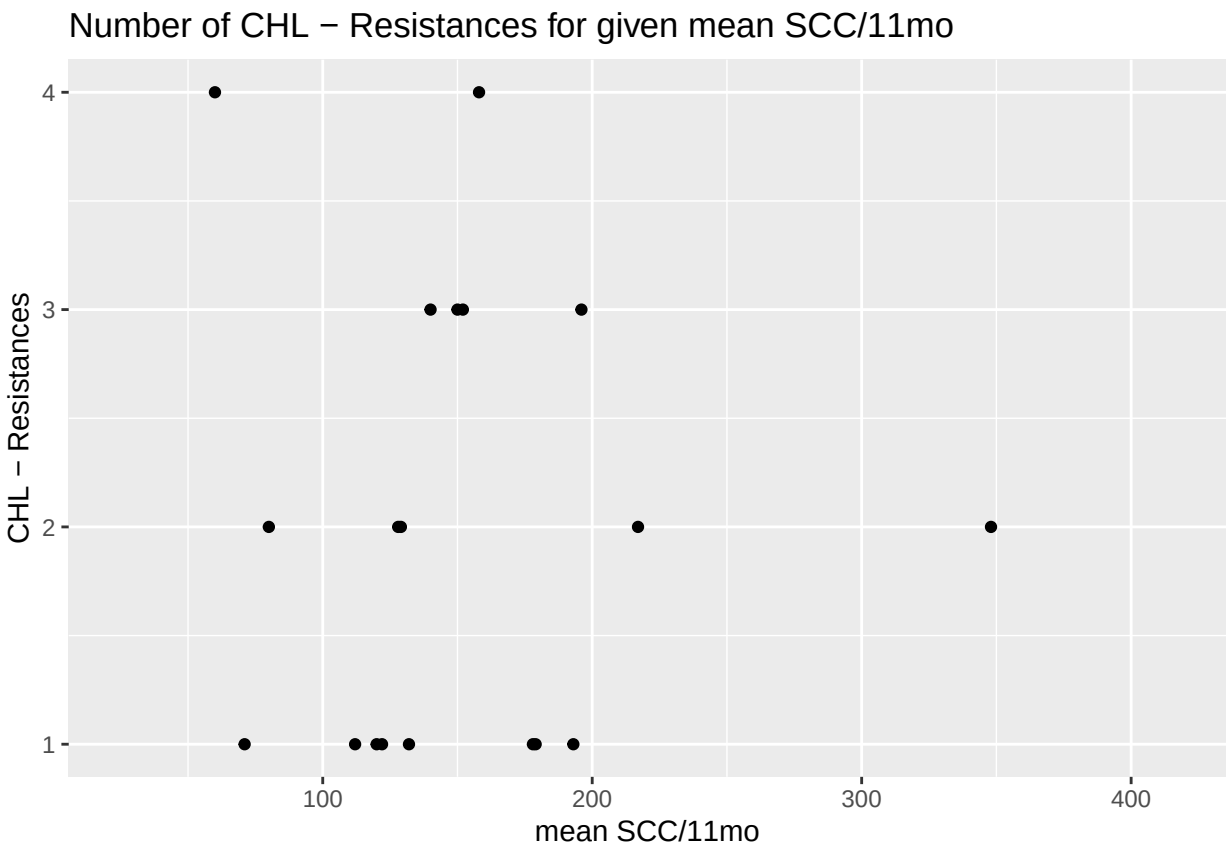


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## [1] ""
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```
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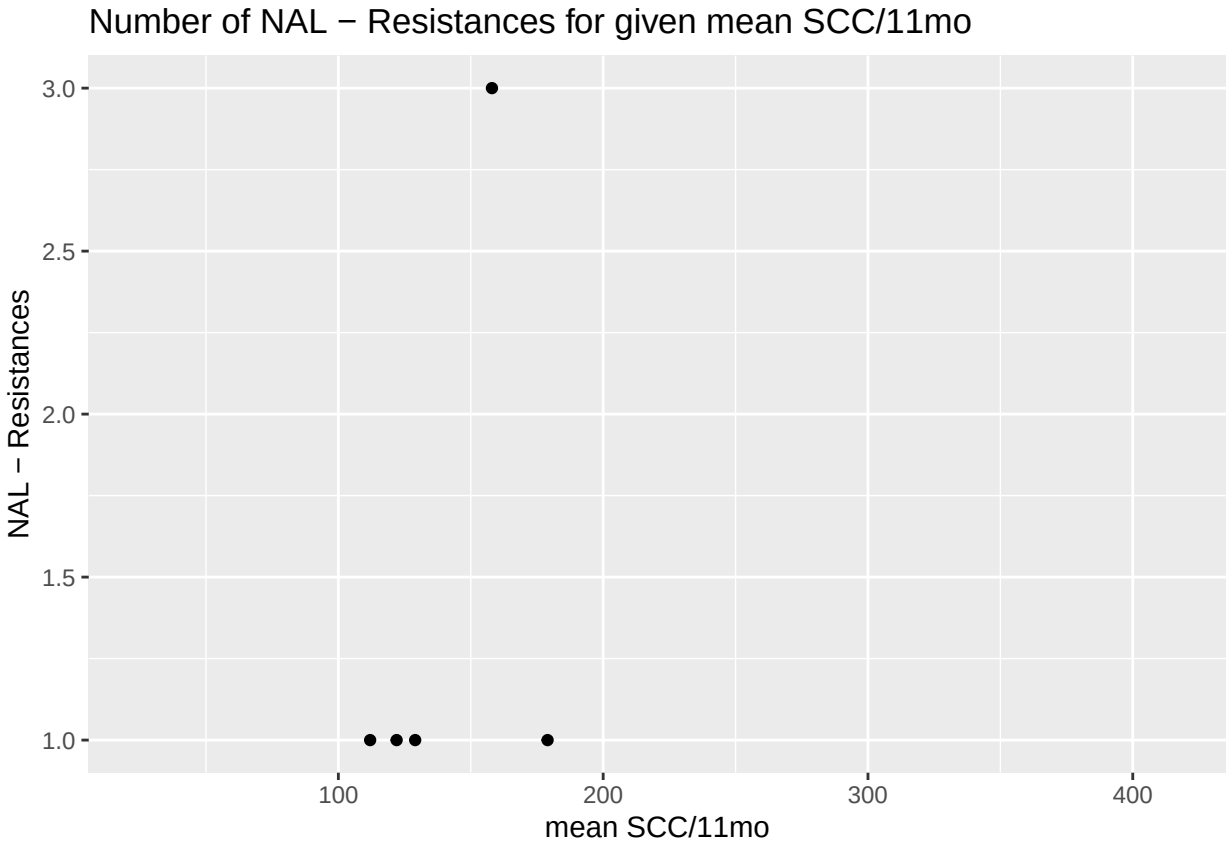


```
## [1] ""
```

```
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```

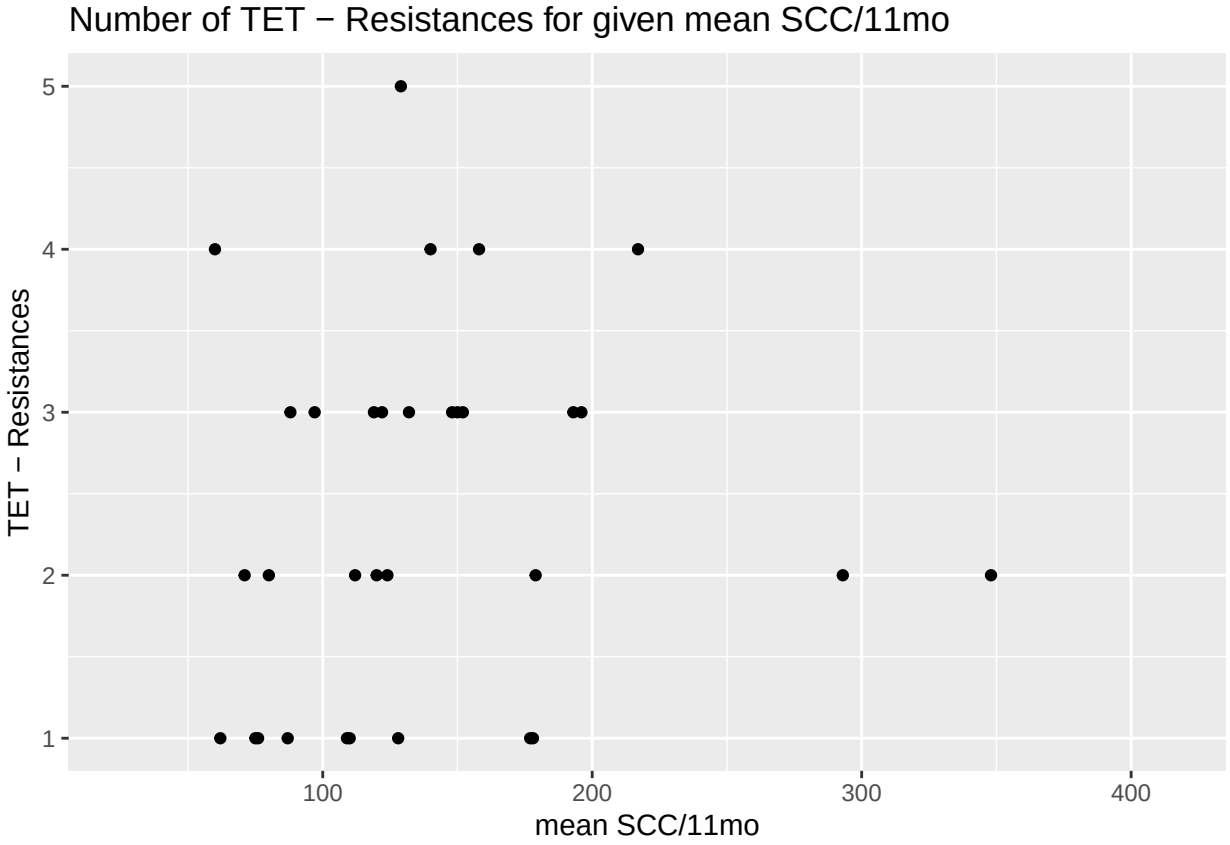


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## [1] ""
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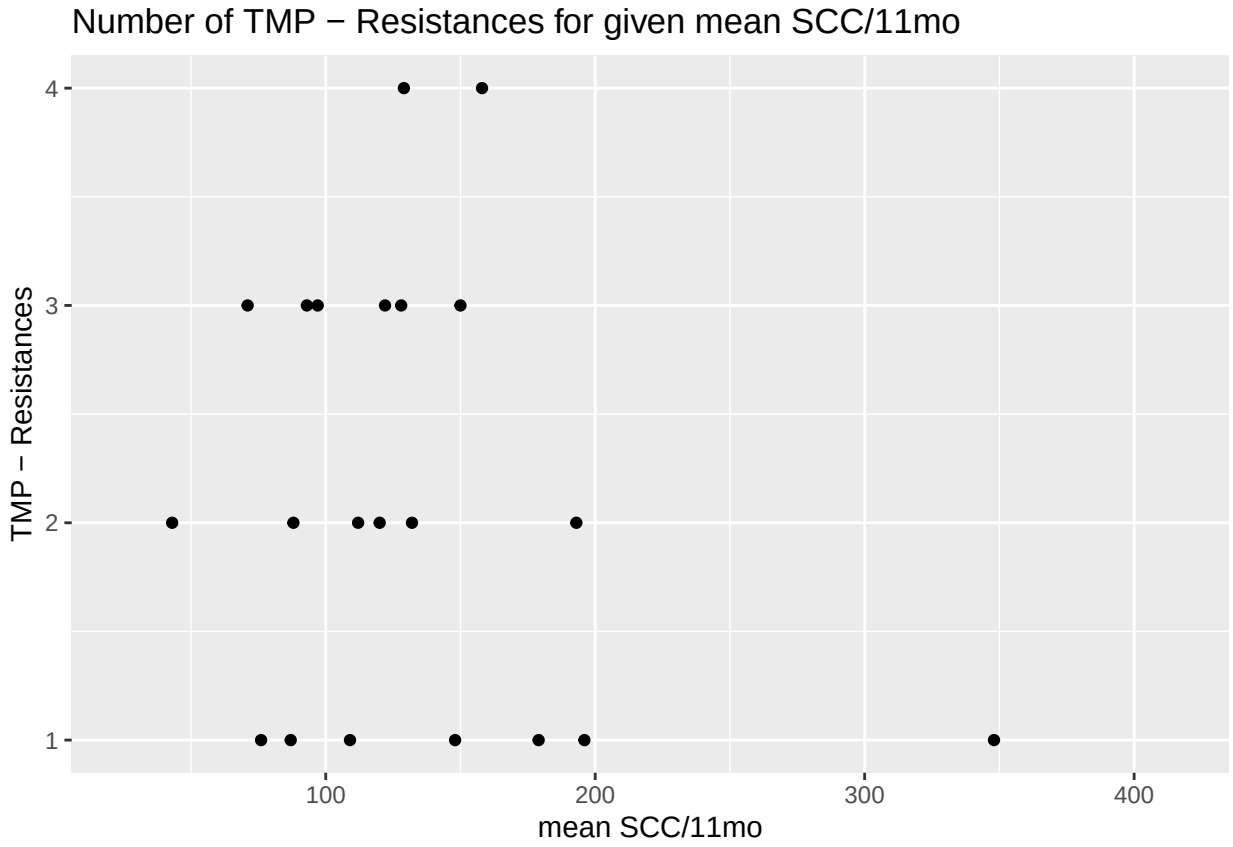
```
## Saving 6.5 x 4.5 in image
```

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## [1] ""
```

```
## Saving 6.5 x 4.5 in image
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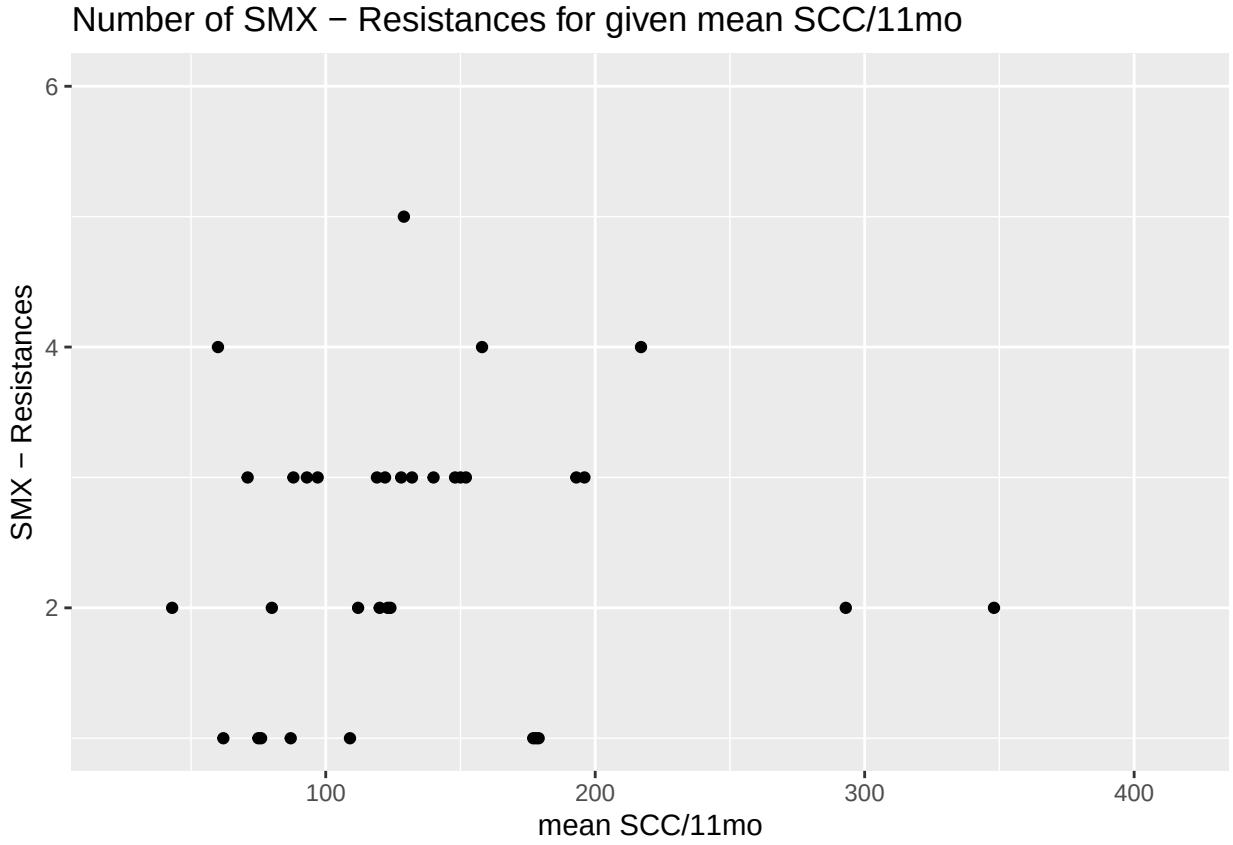
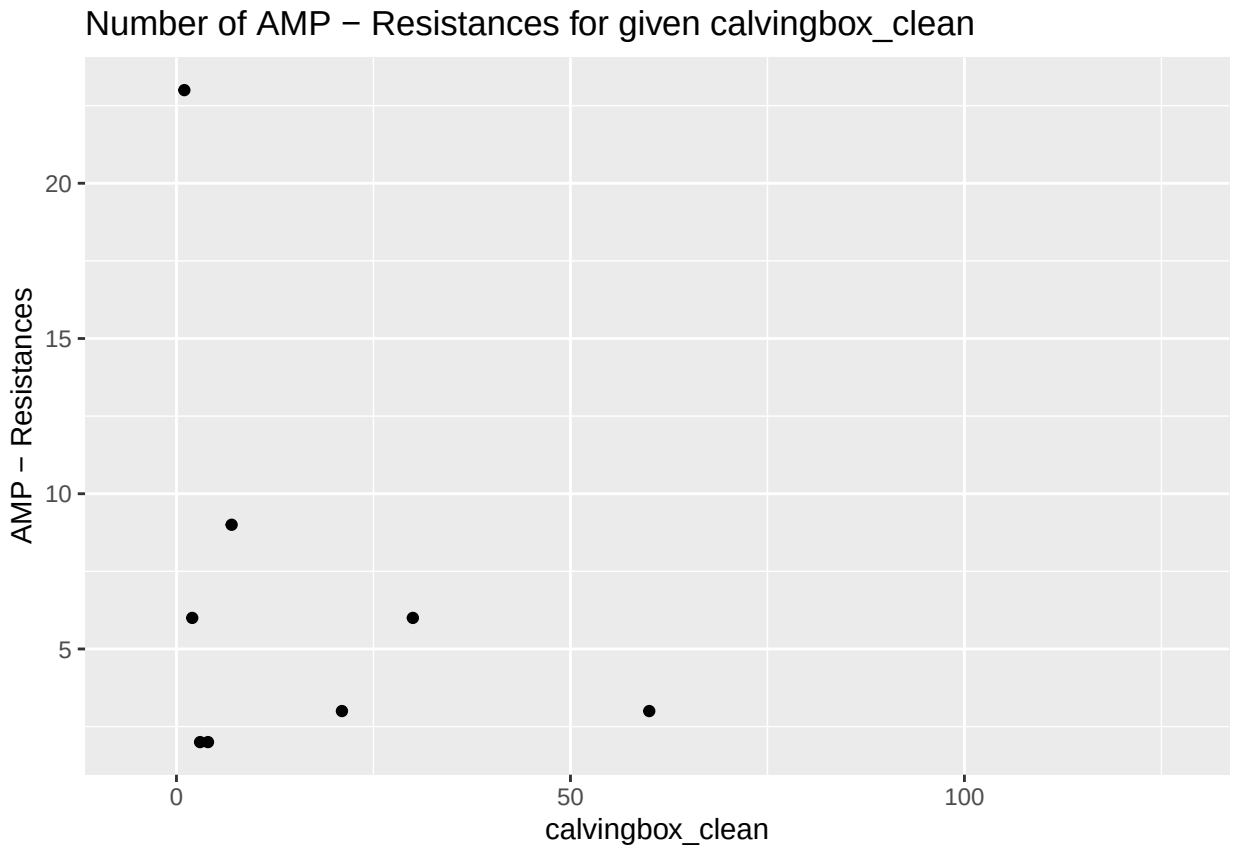


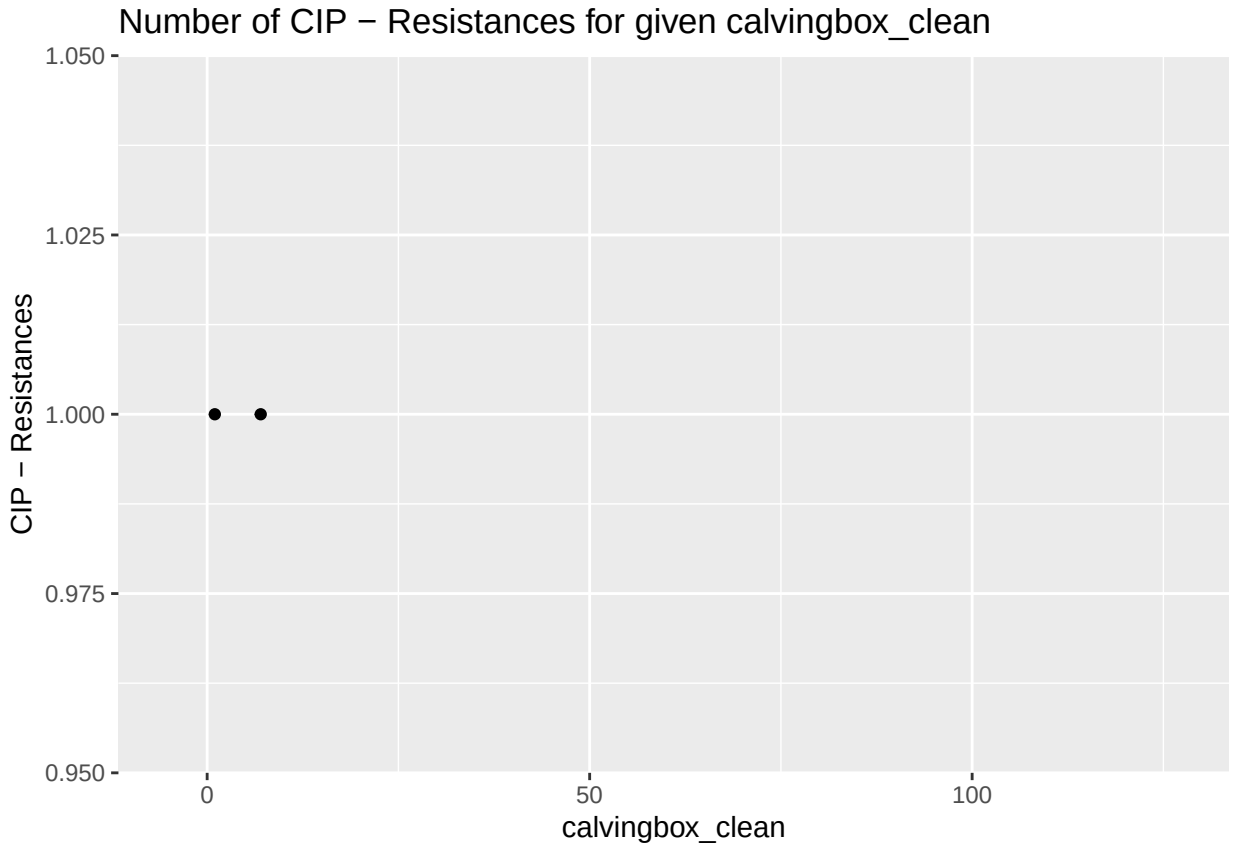

```
## [1] ""
## [1] "------------------------------------------------------------"
```

```
## Saving 6.5 x 4.5 in image
```



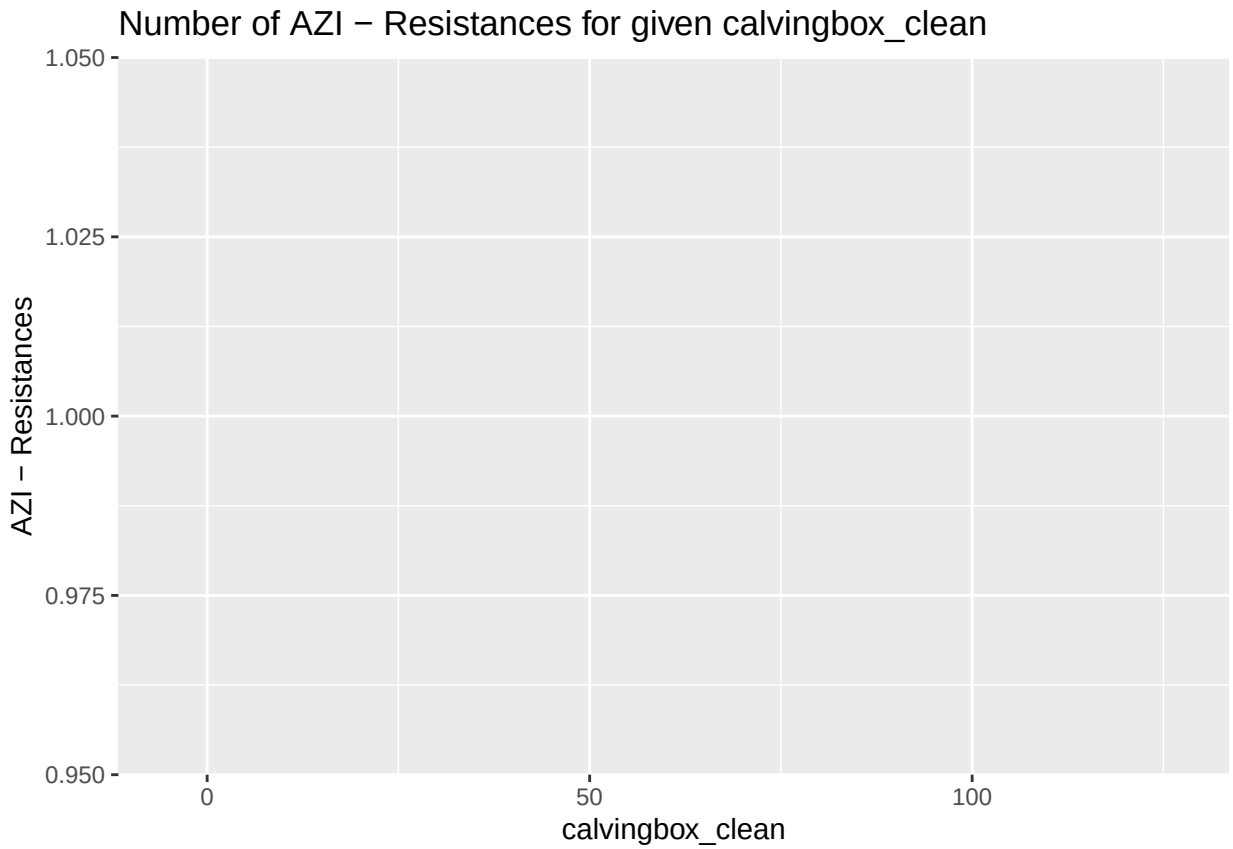

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



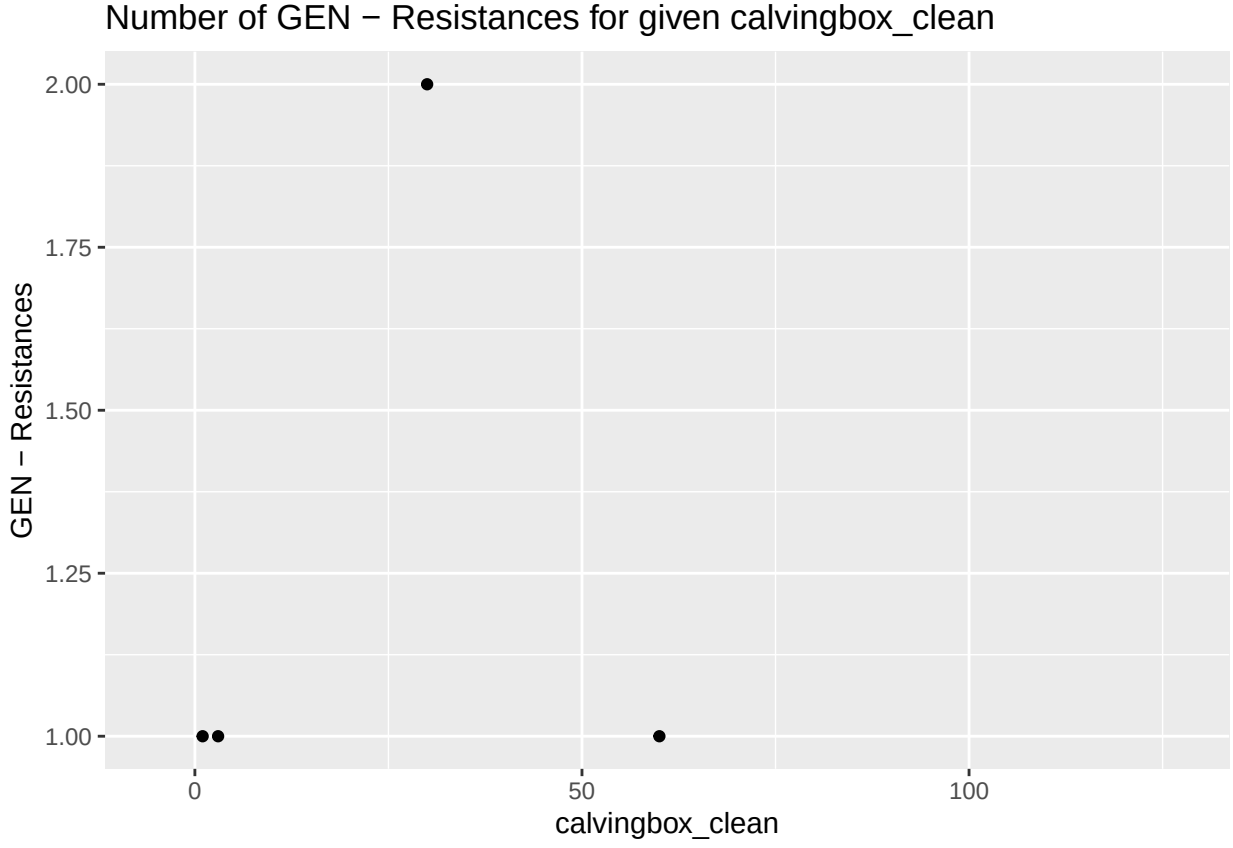

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



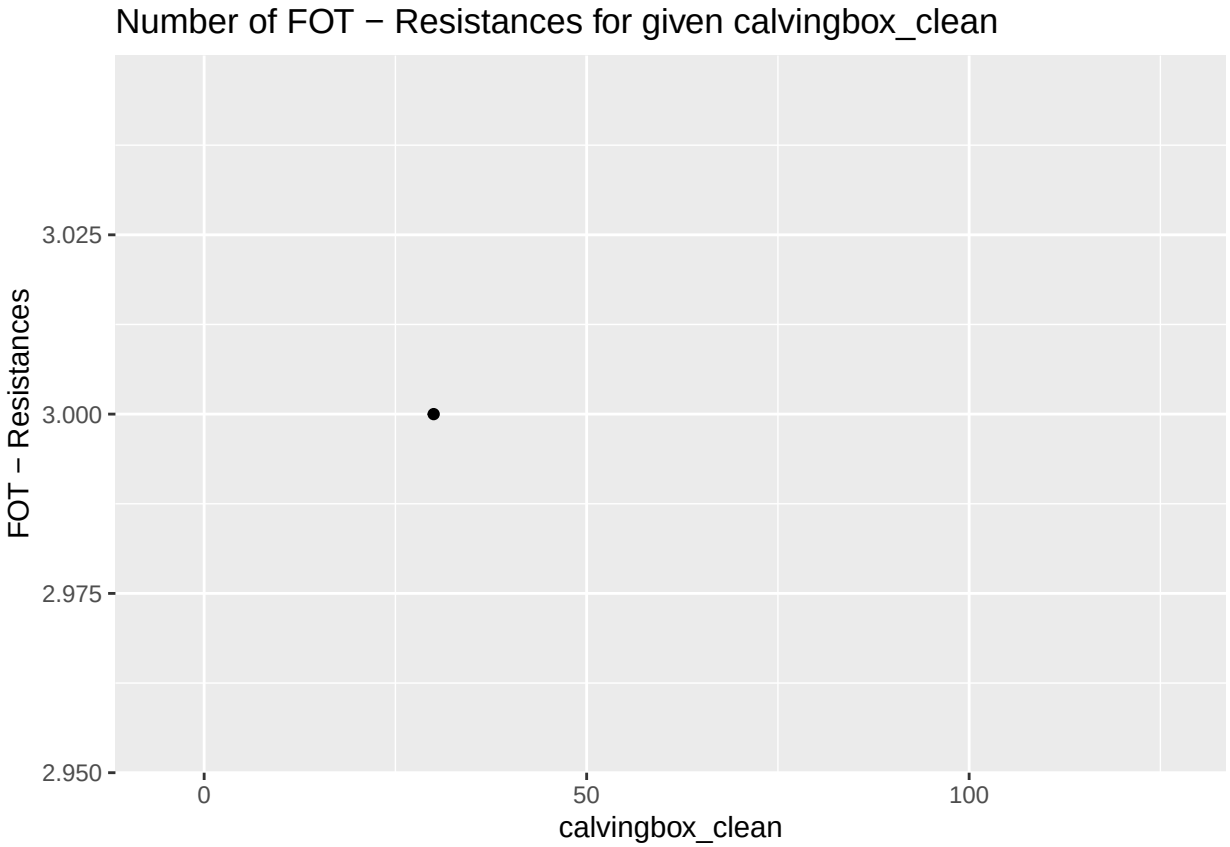

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```




```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```




```
## [1] ""
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```
## Saving 6.5 x 4.5 in image
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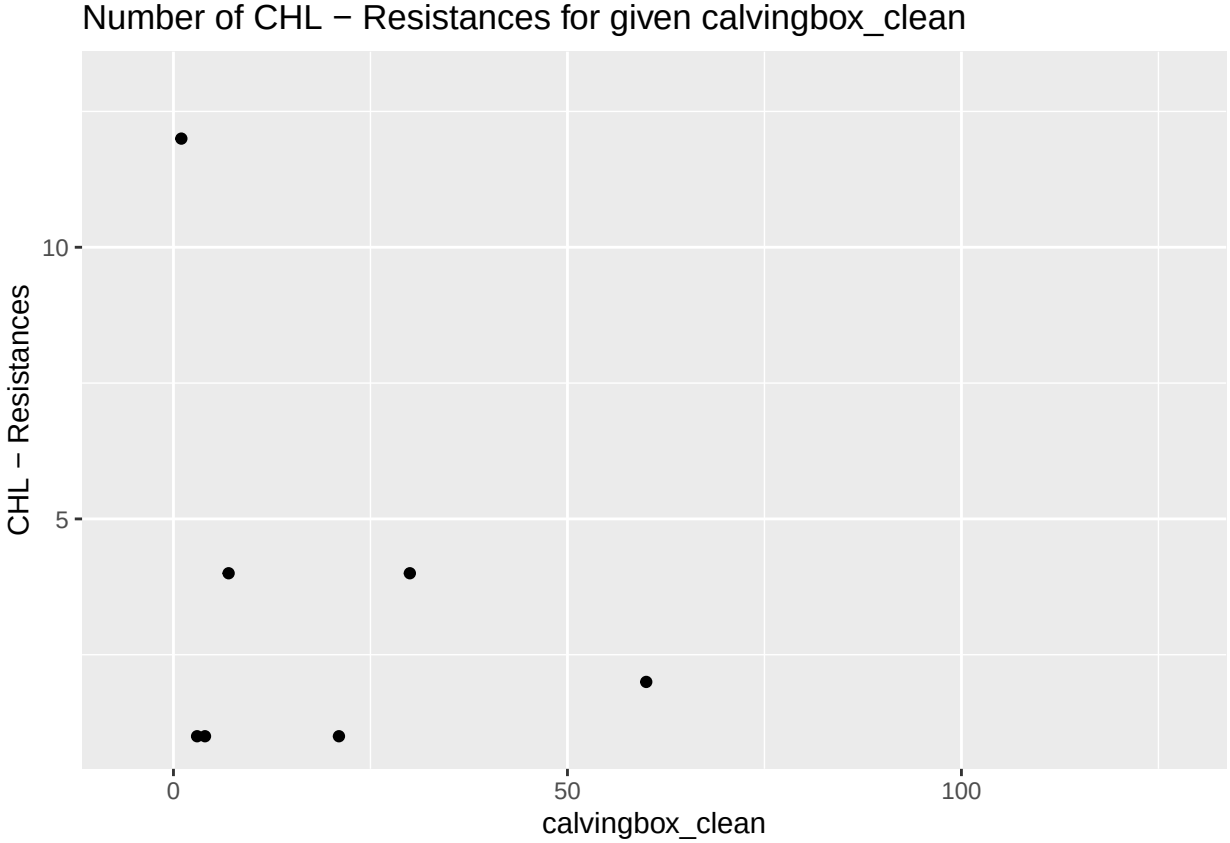
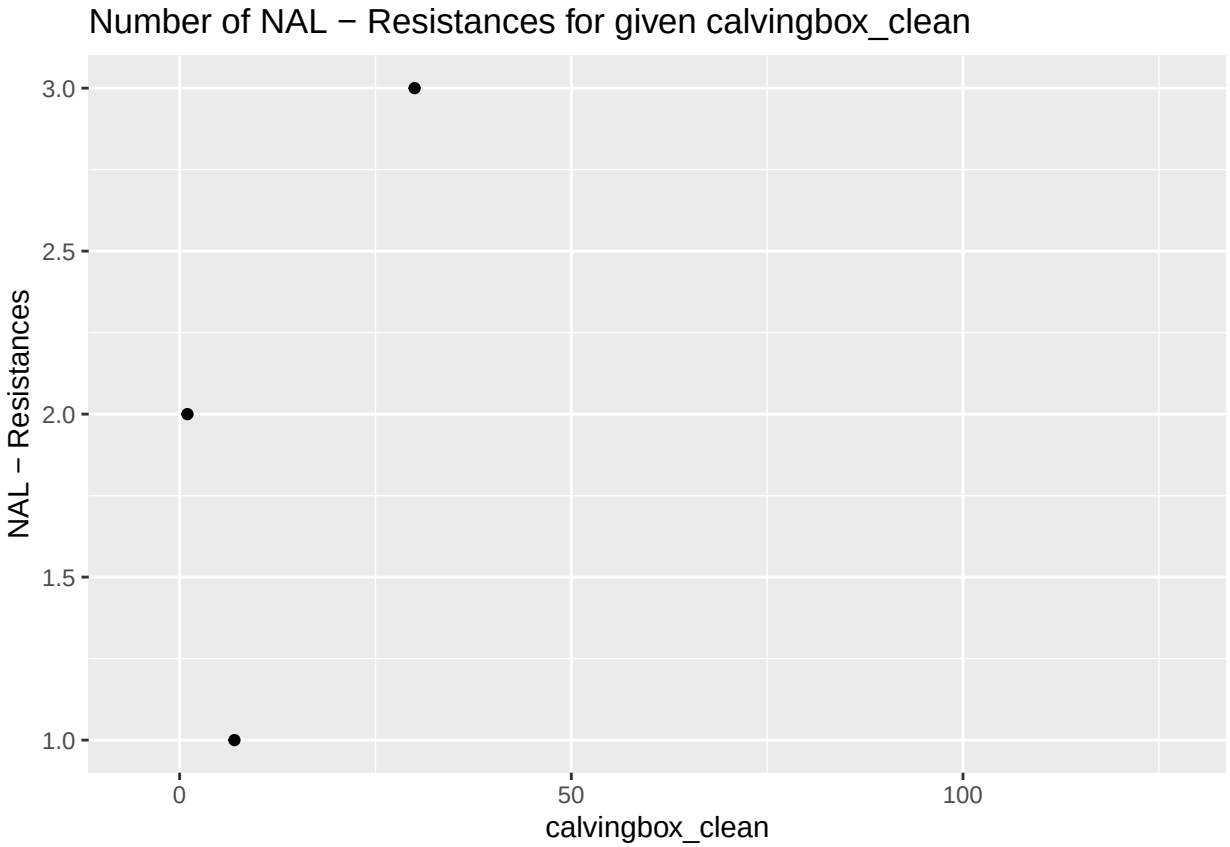



```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```

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## [1] ""
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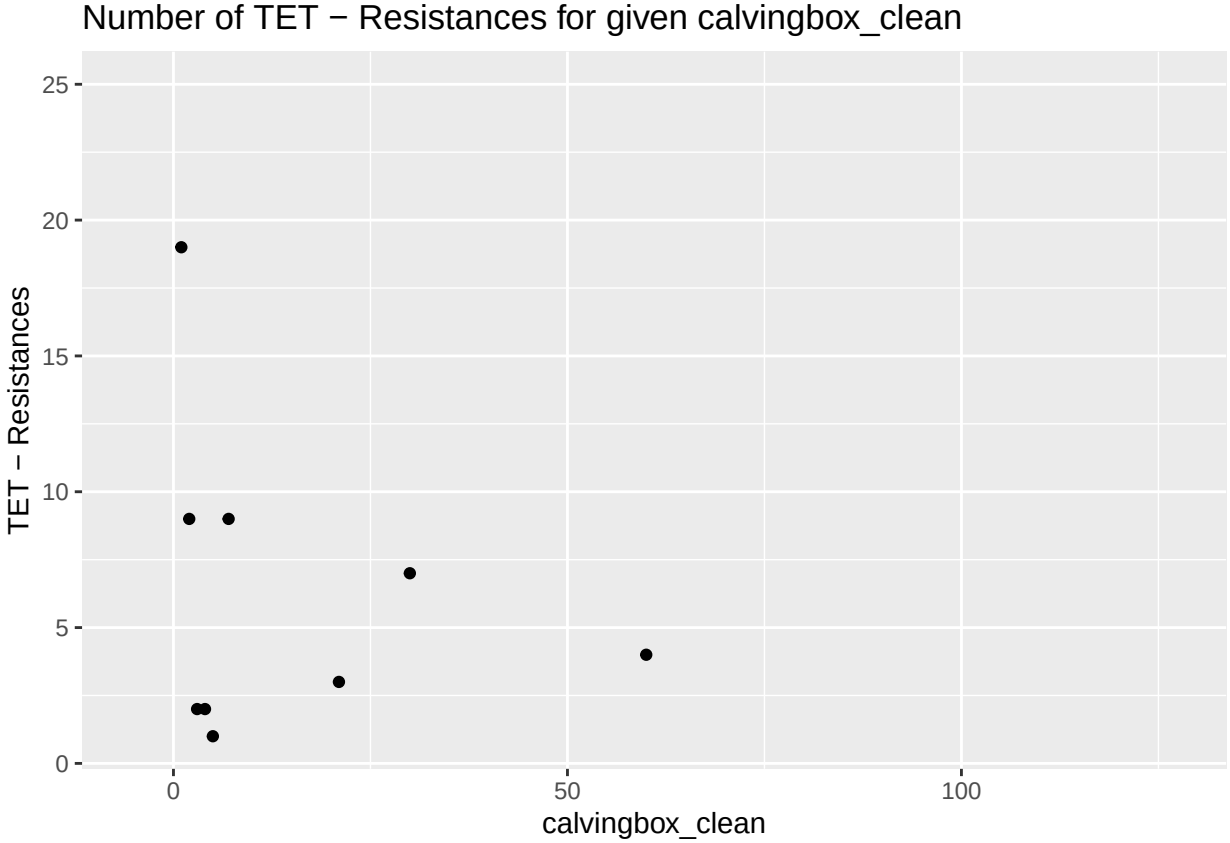
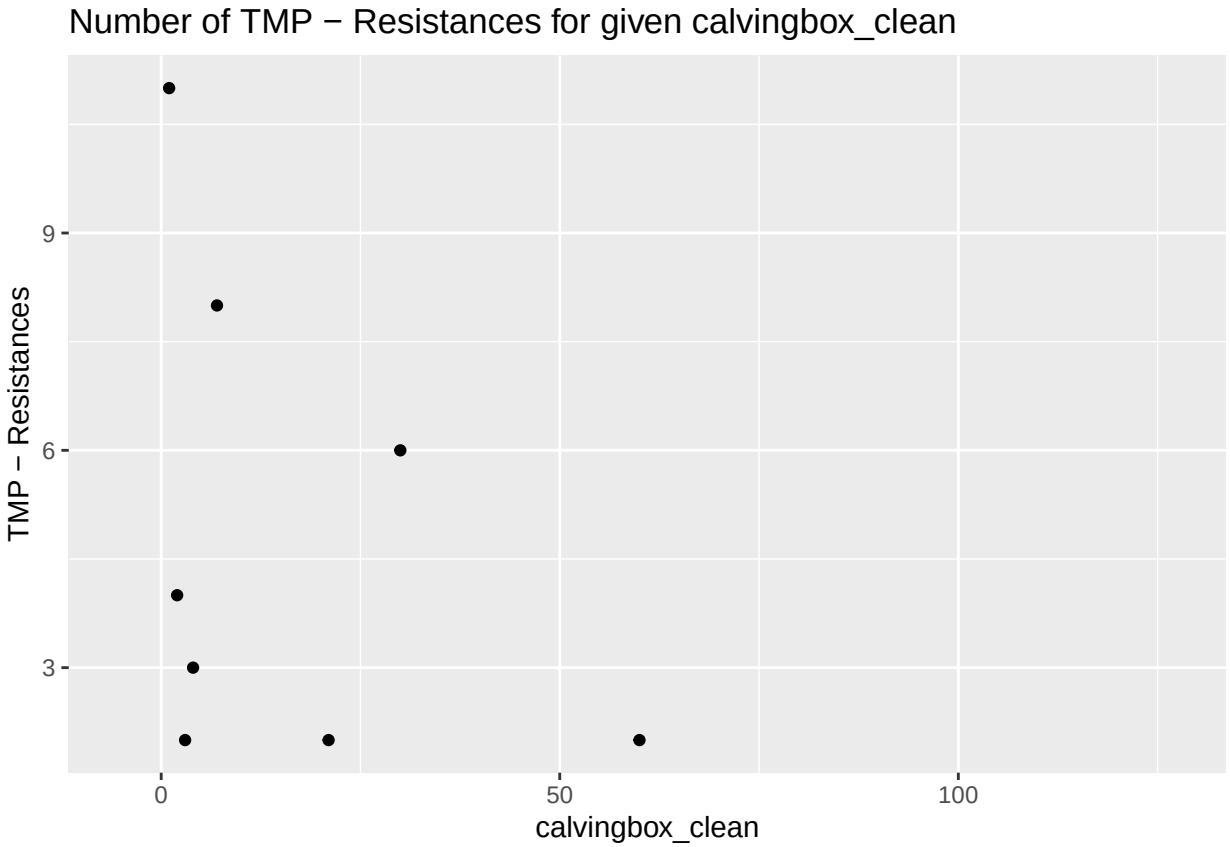
```
## Saving 6.5 x 4.5 in image
```



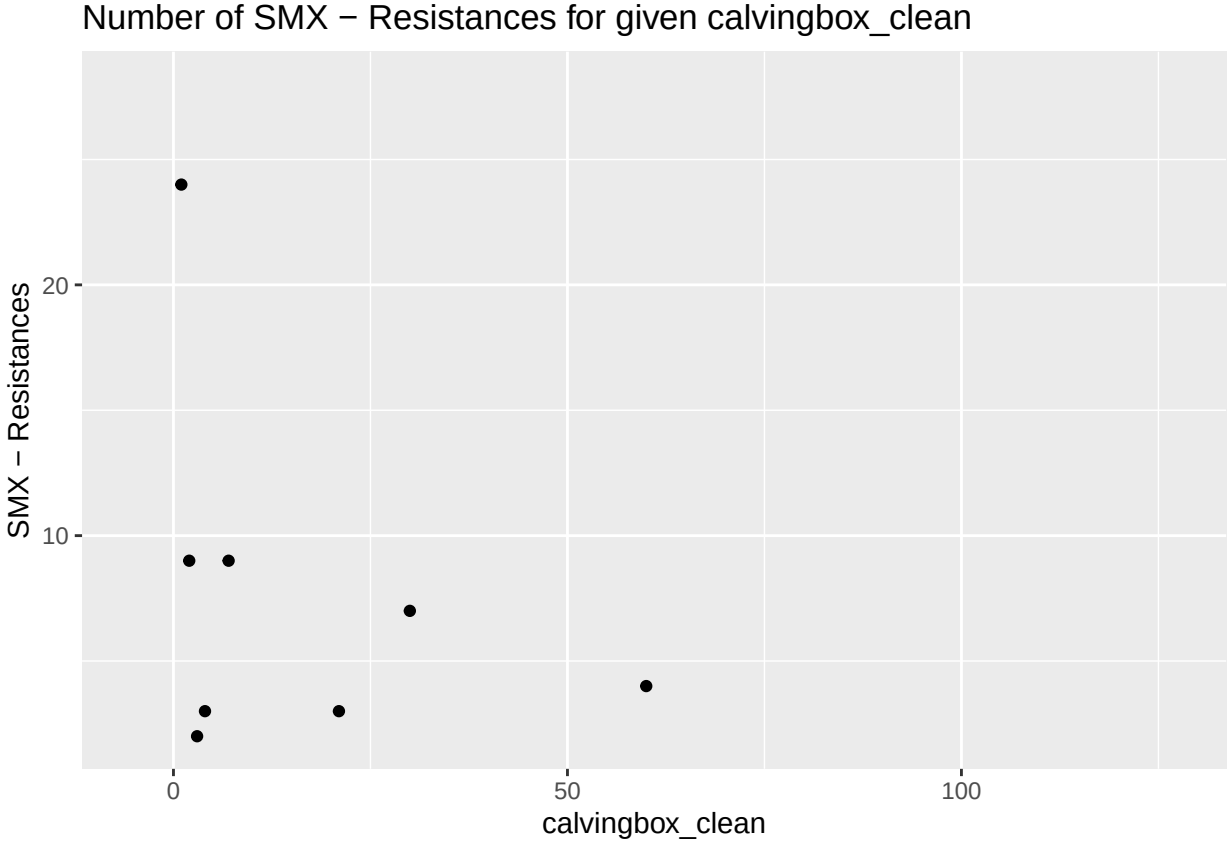

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



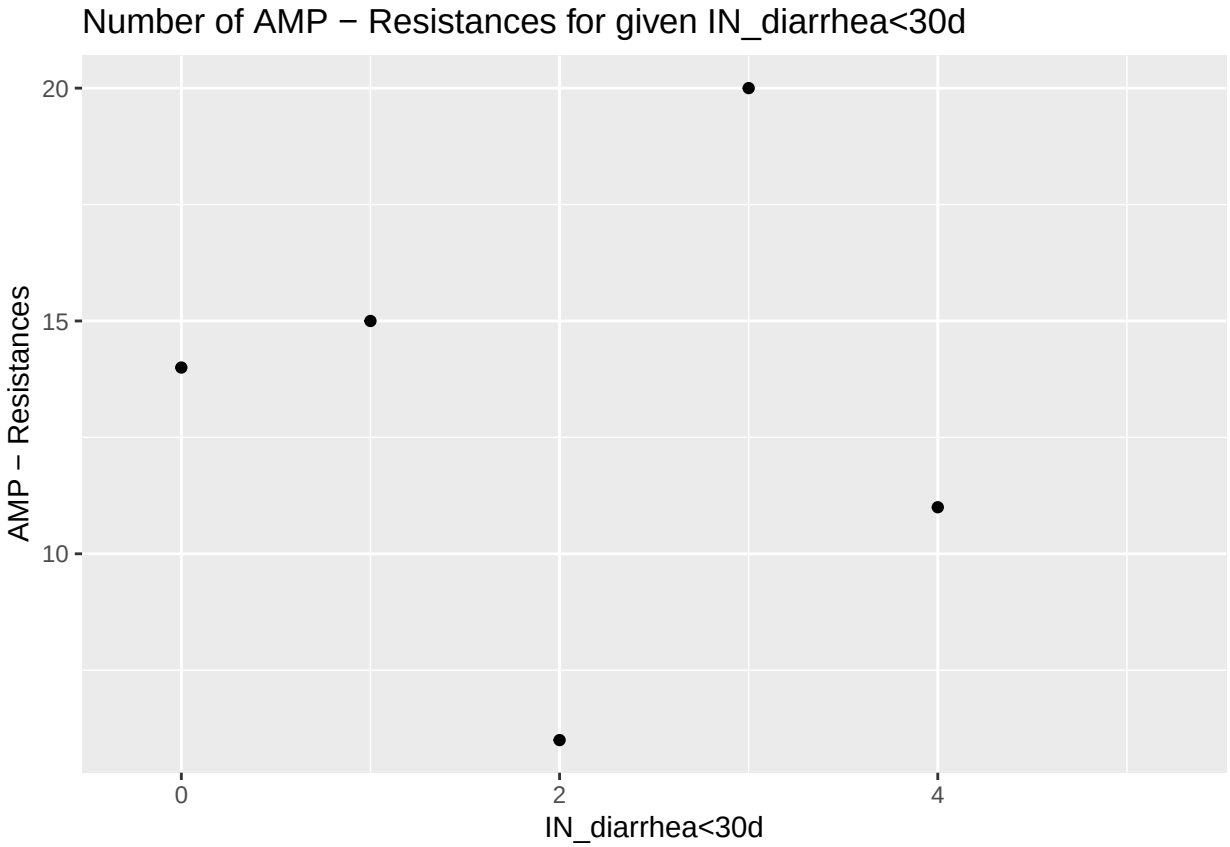

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



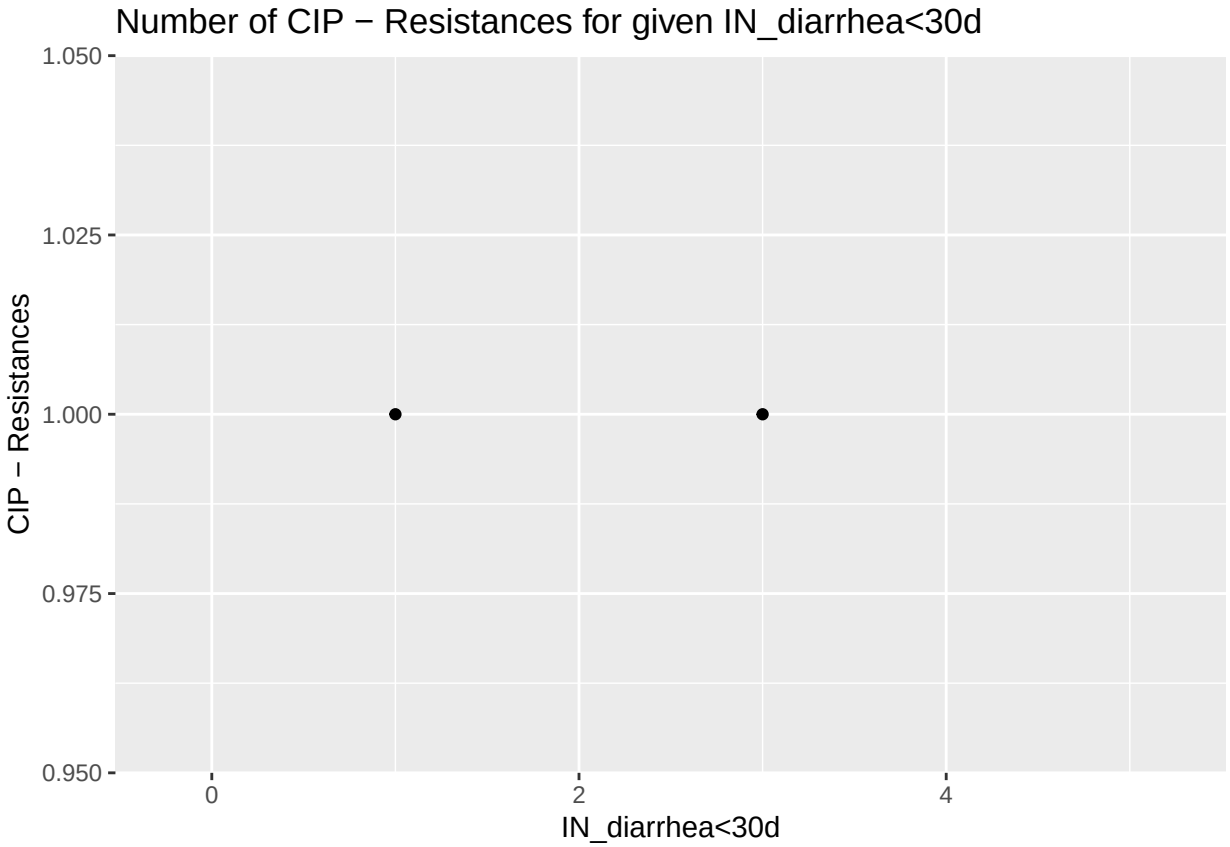

```
## [1] ""
## [1] "------------------------------------------------------------"
```

```
## Saving 6.5 x 4.5 in image
```




```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```




```
## [1] ""
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```
## Saving 6.5 x 4.5 in image
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```
## [1] ""
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## Saving 6.5 x 4.5 in image
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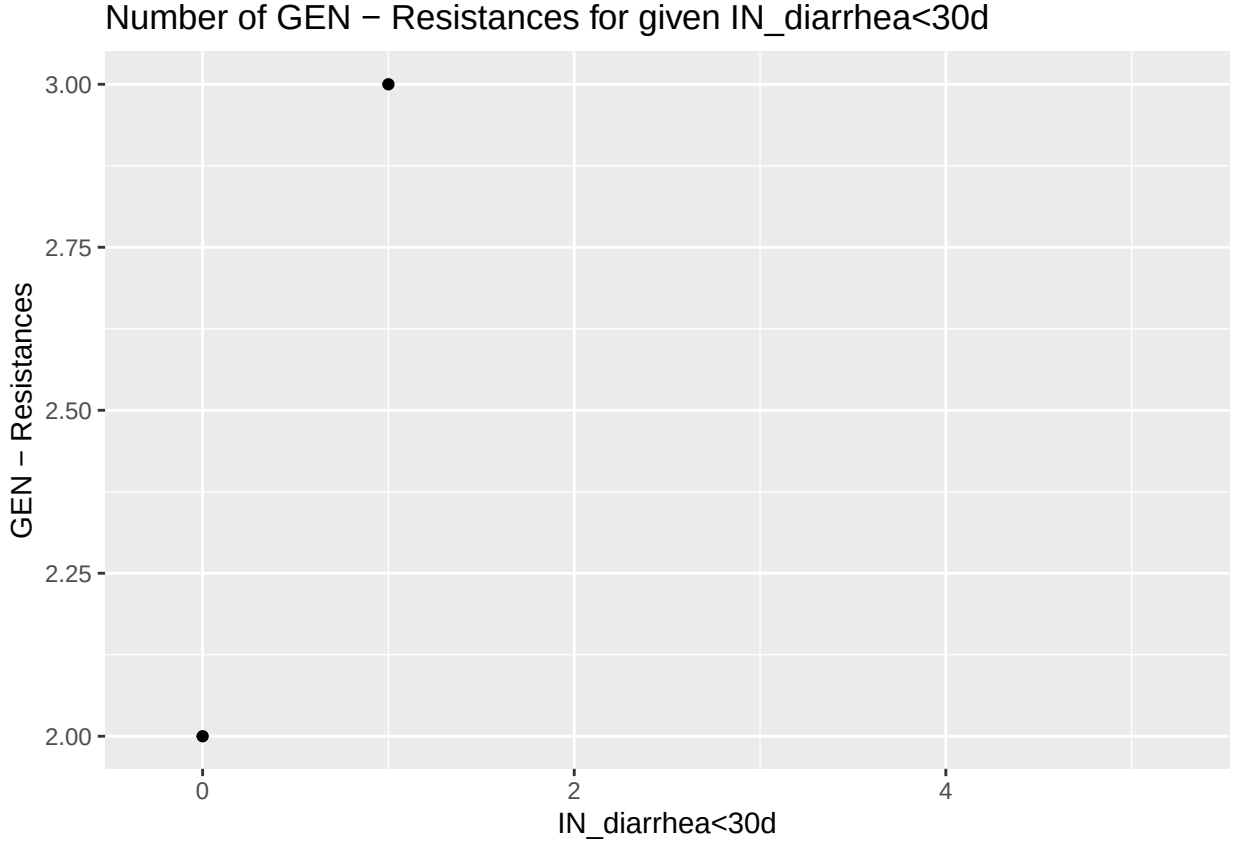


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## [1] ""
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```
## Saving 6.5 x 4.5 in image
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## [1] ""
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## Saving 6.5 x 4.5 in image
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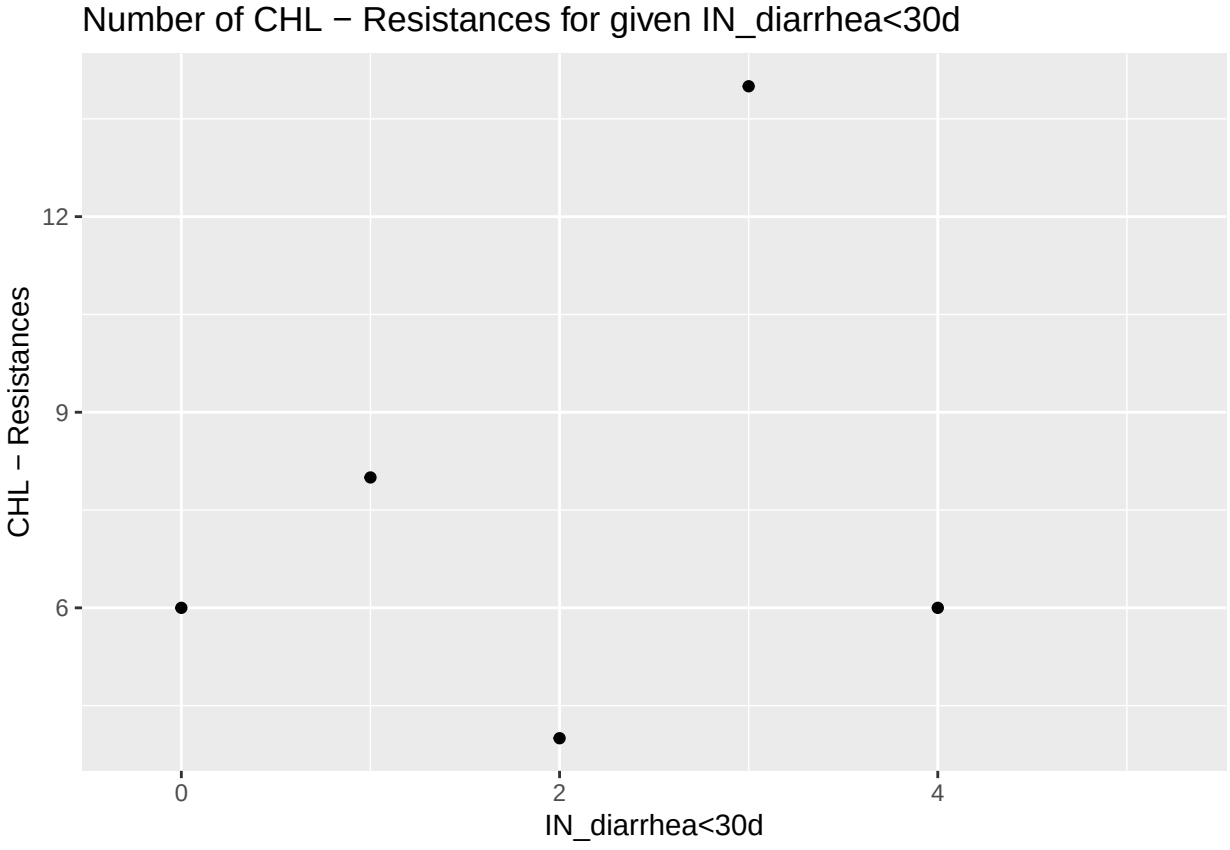
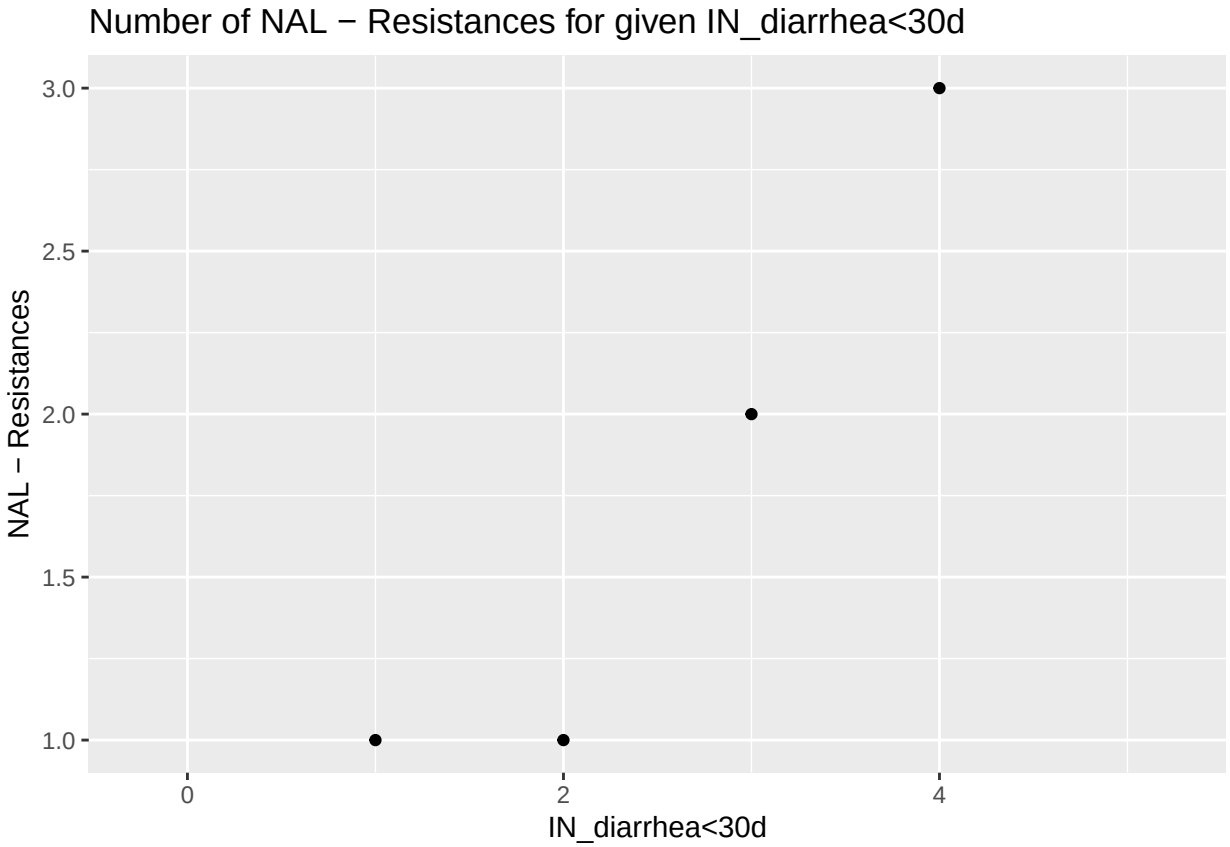


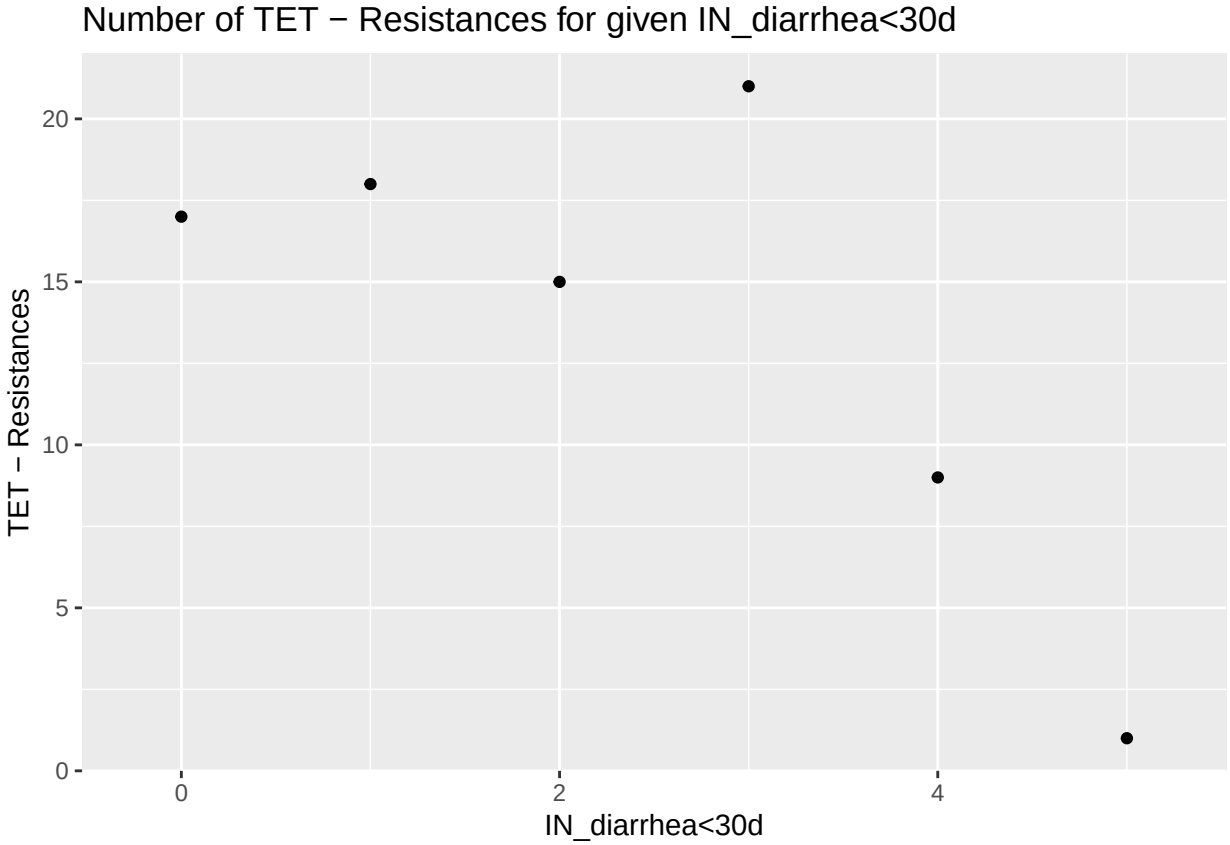

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



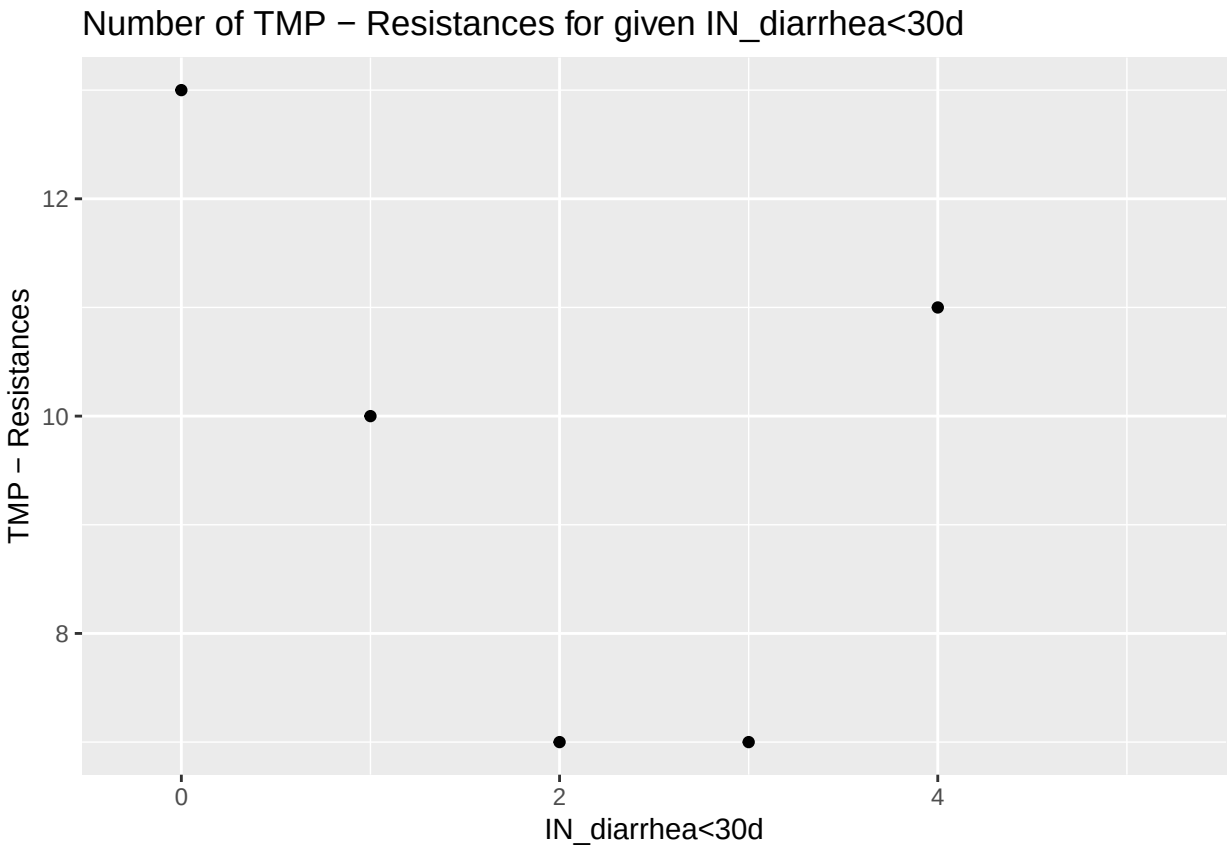

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



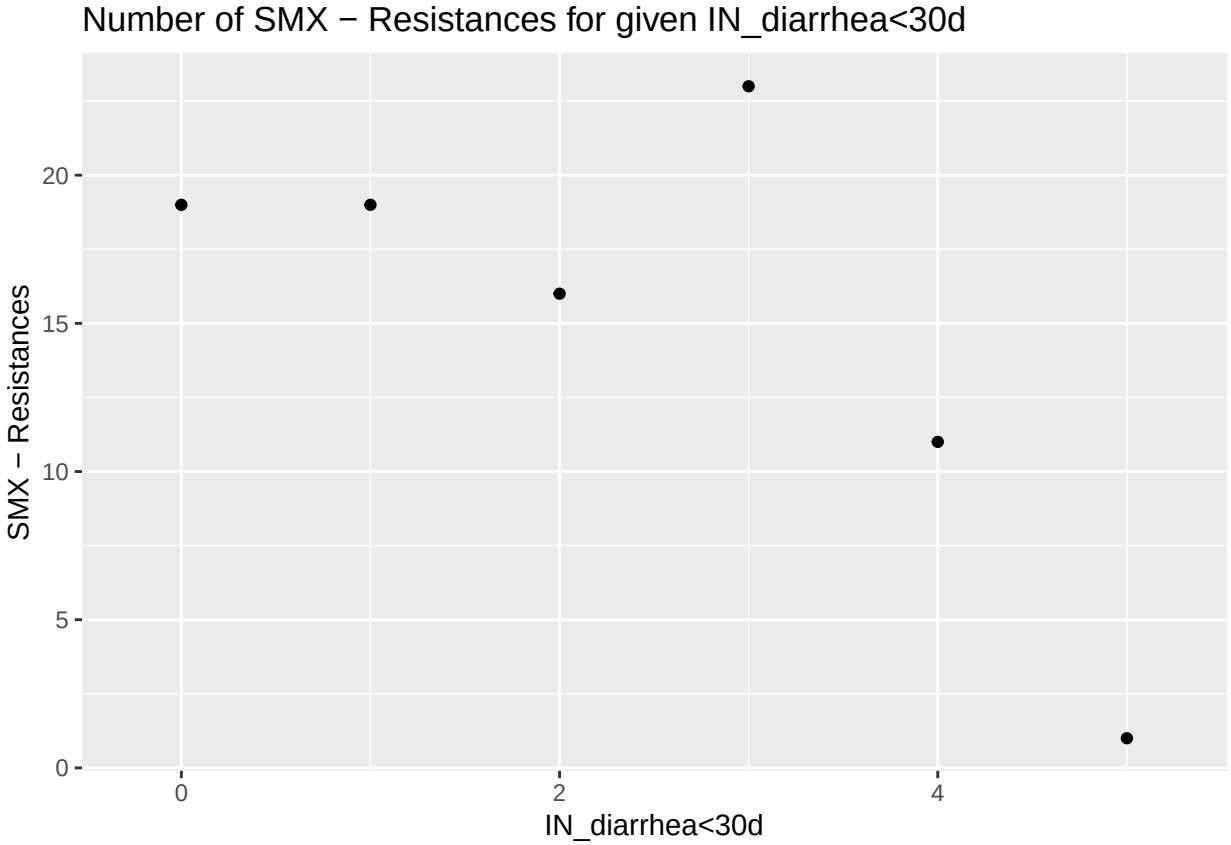

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```




```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```




```
## [1] ""
## [1] "------------------------------------------------------------"
```

Ungeschichtet: Resistenzen scheinen tendenziell zu

- steigen mit MY.group

- fallen mit SCC.group, CBC.group
- ? mit DIA.group

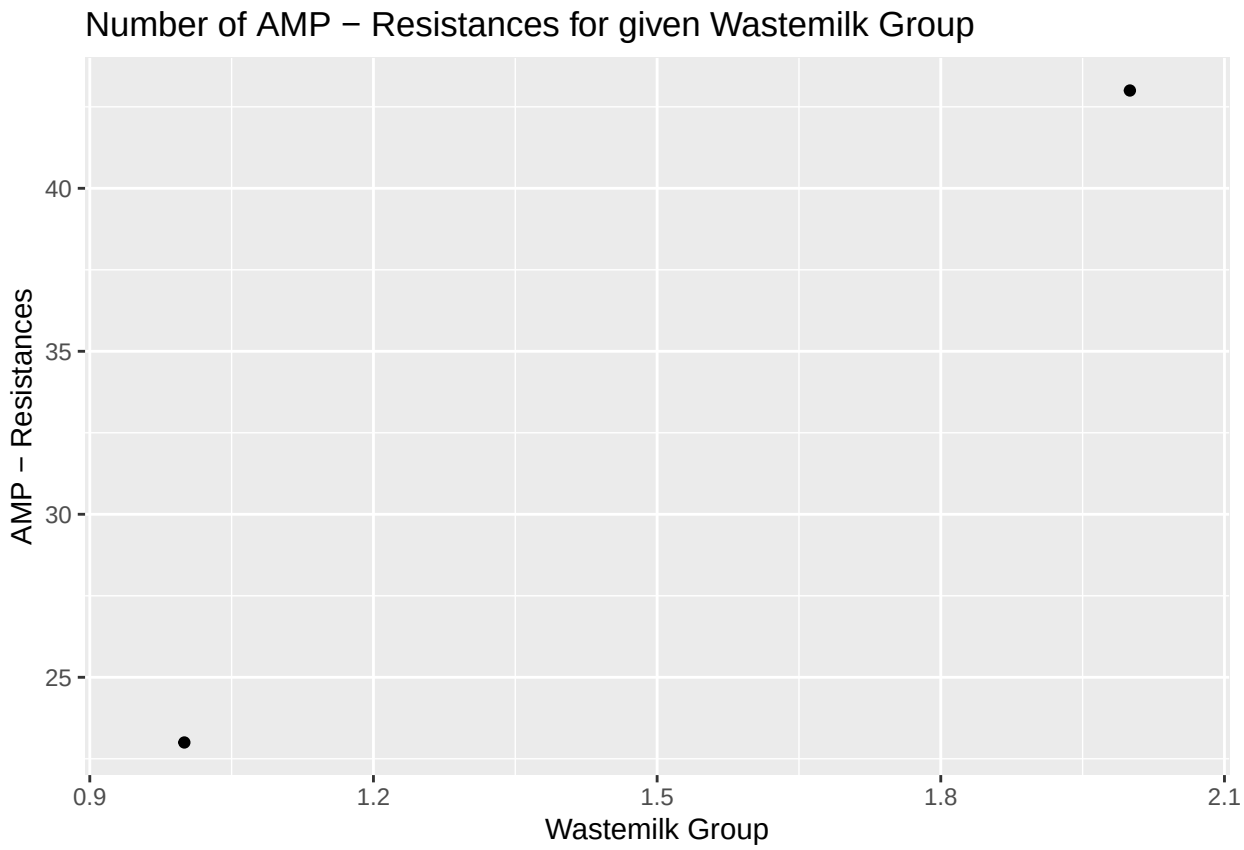
Eine Regression sagt mehr.

Binäre und Nominale Unabhängige Variablen

Anzahl Resistenzen

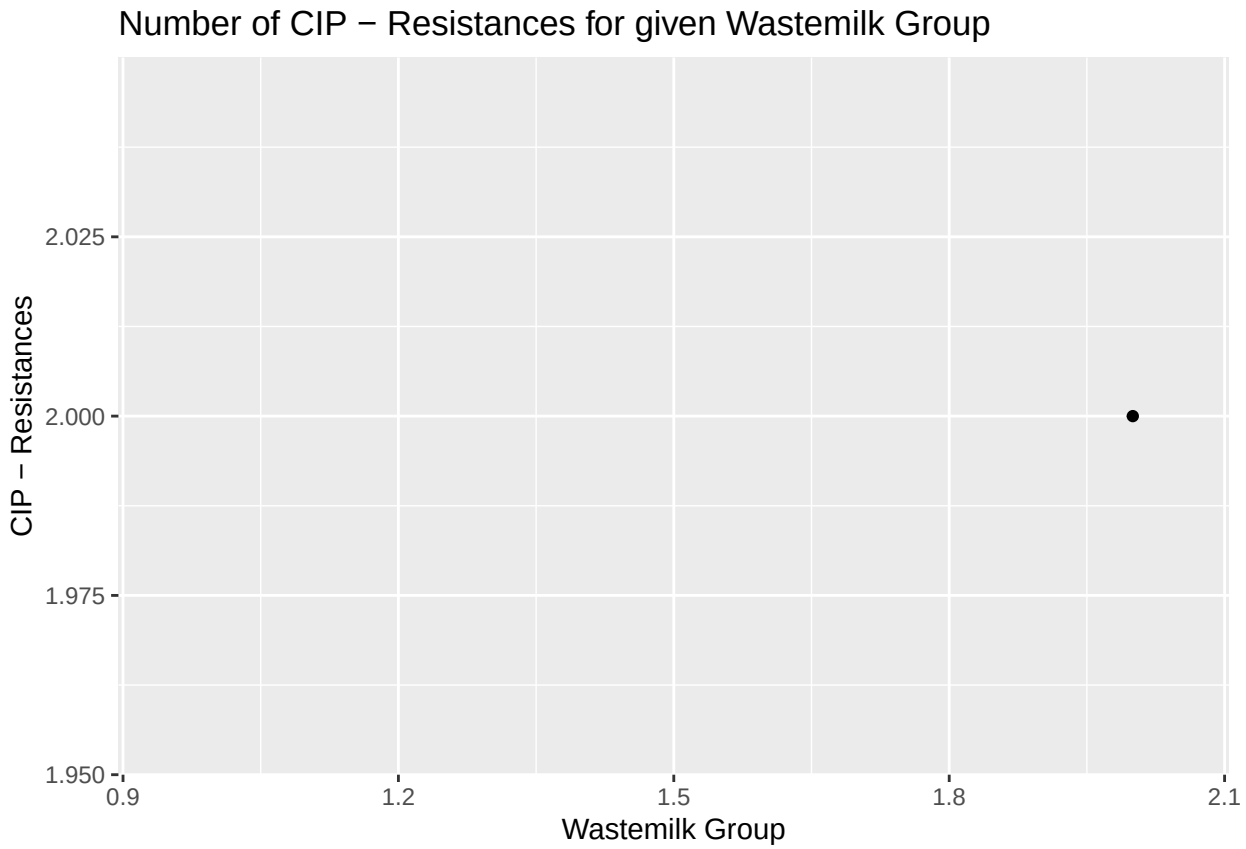
```
# NA warnings interessieren nicht

# untersuchte binäre und nominale Variablen

### neue binäre oder nominale hier dazufügen : ###
bin_nom <- c("WM.group", "OLS.group","IAC.group",   "HSC.group")

for( group in bin_nom ){
  for( antib in c("AMP","CIP","AZI","GEN","FOT","CHL","NAL","TET","TMP","SMX") ){
    graphisch2(group,"for given",antib)
    print("")
  }
  print("------------------------------------------------------------")
}
```

```
## Saving 6.5 x 4.5 in image
```



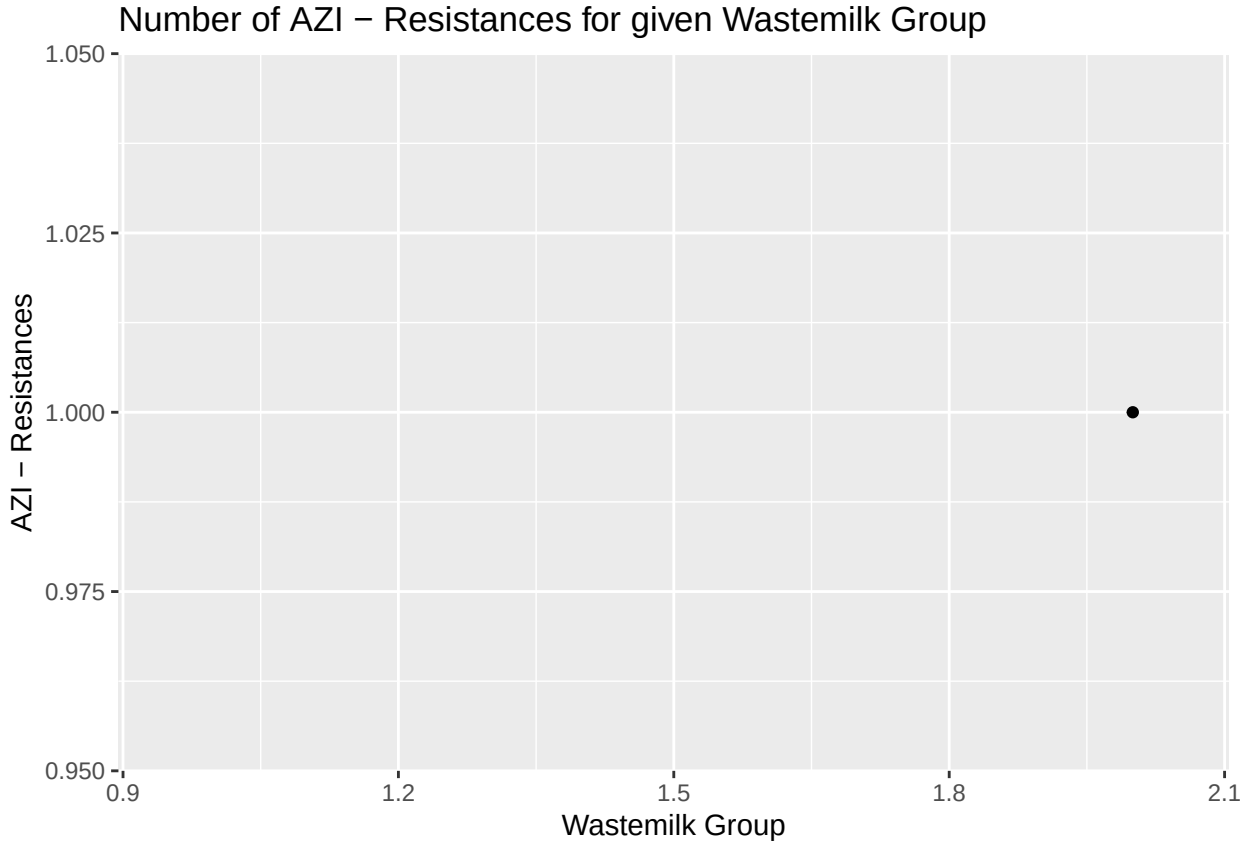

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



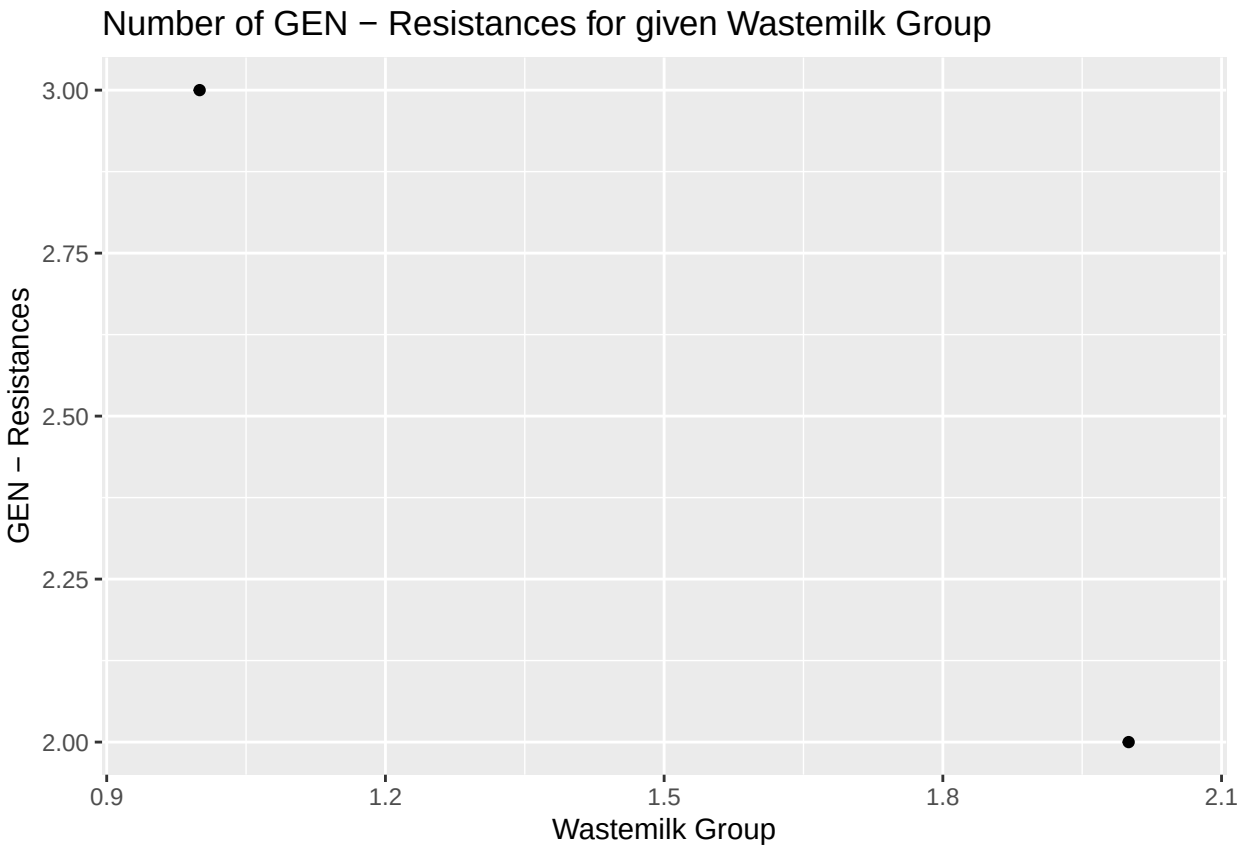

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



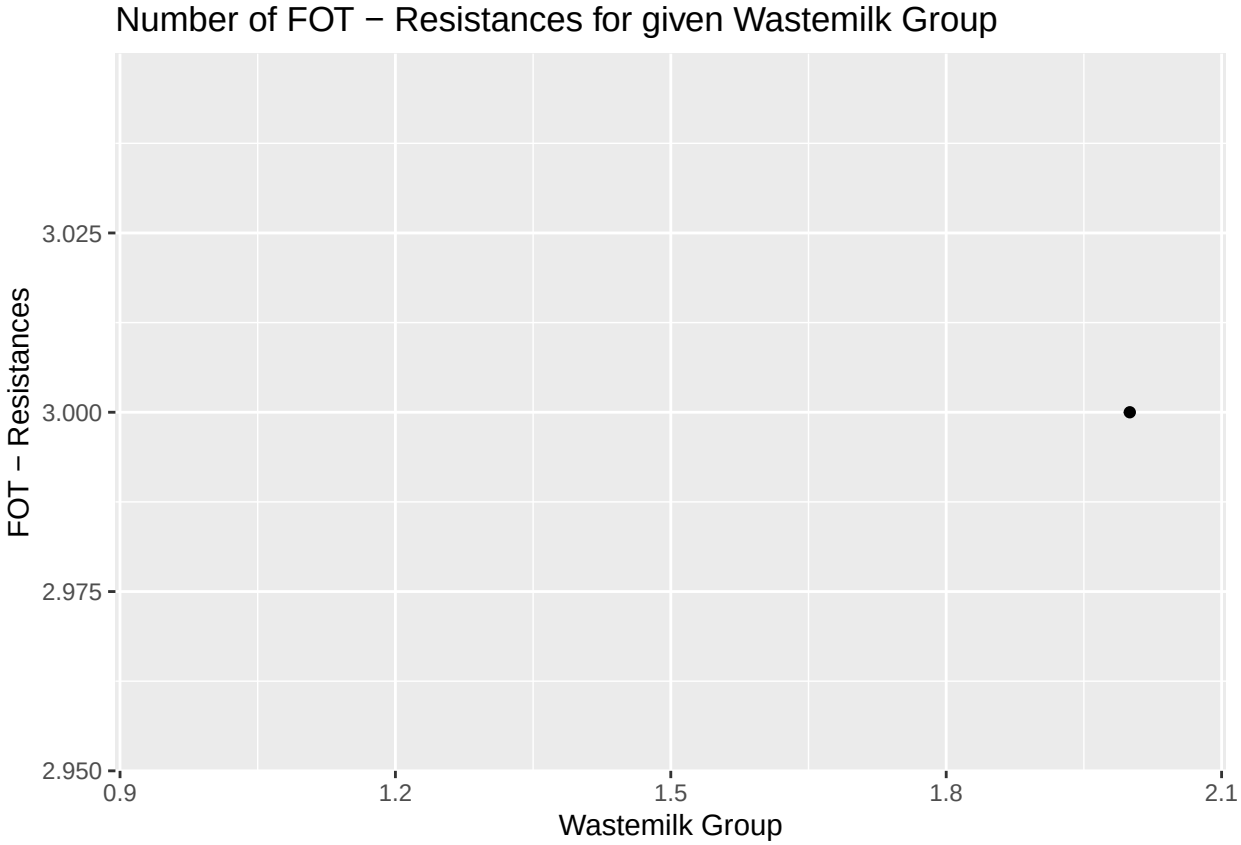

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



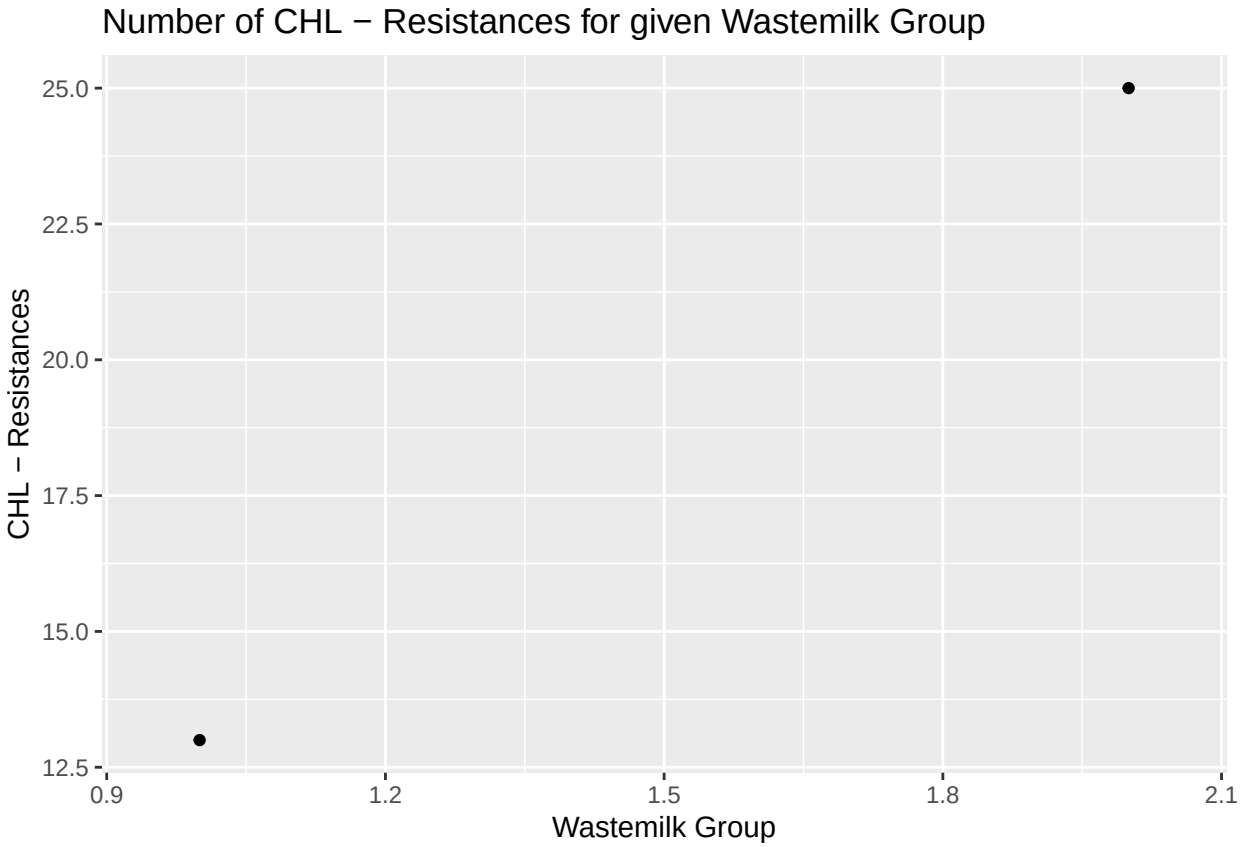

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



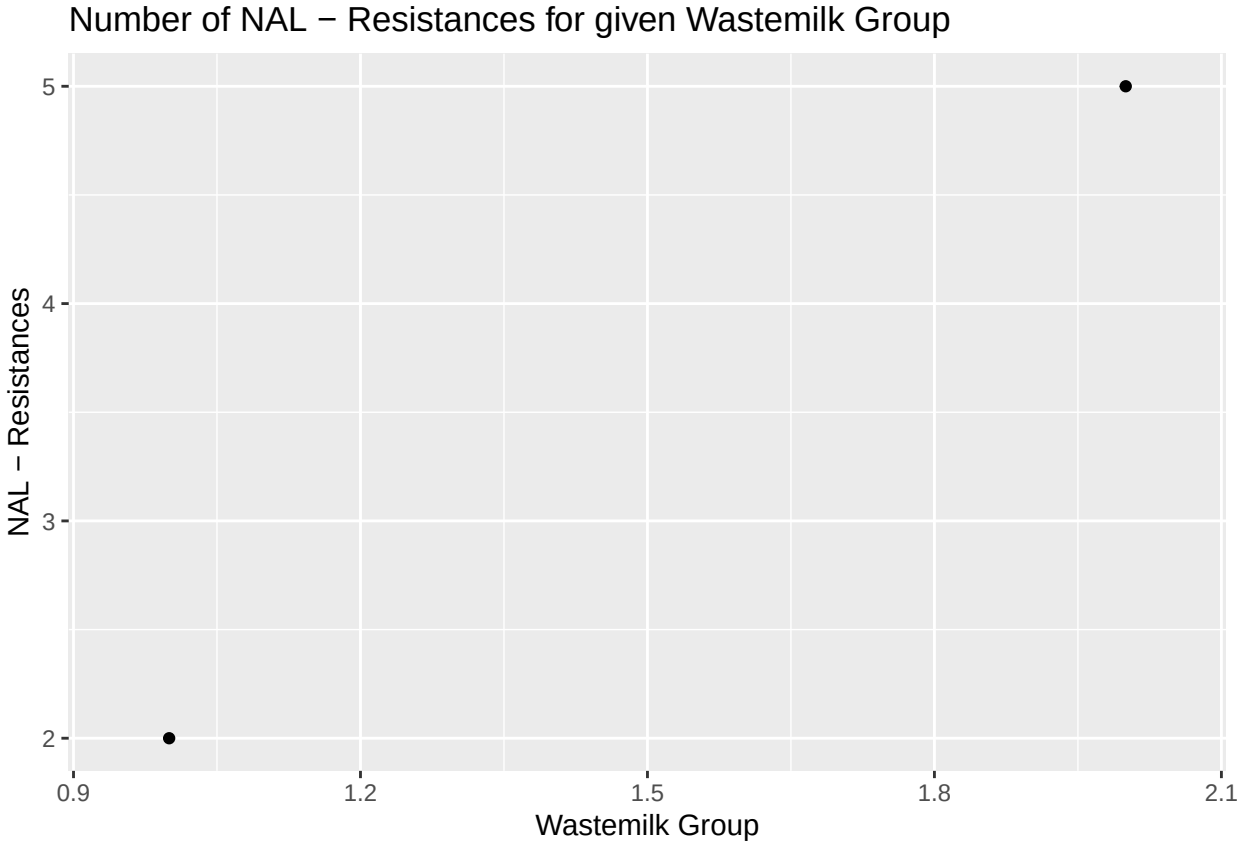

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



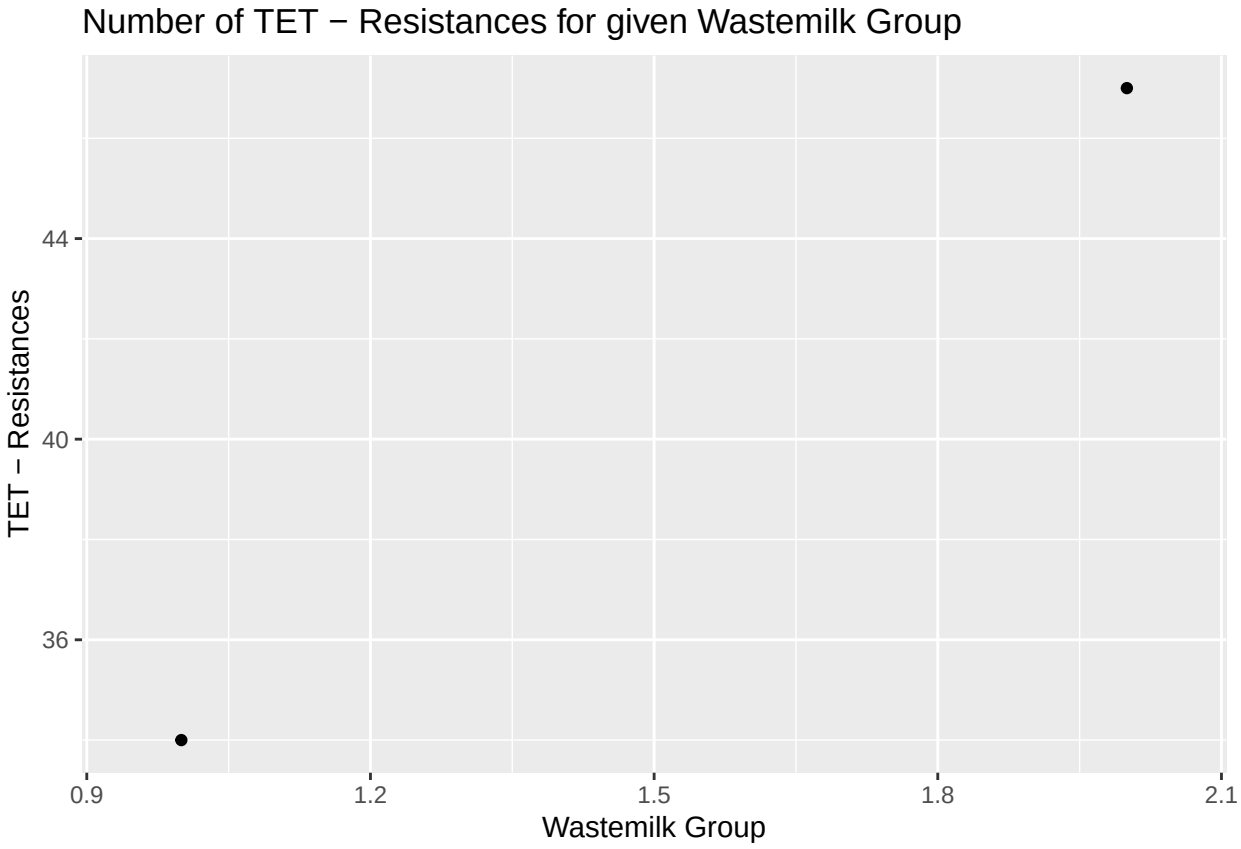

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



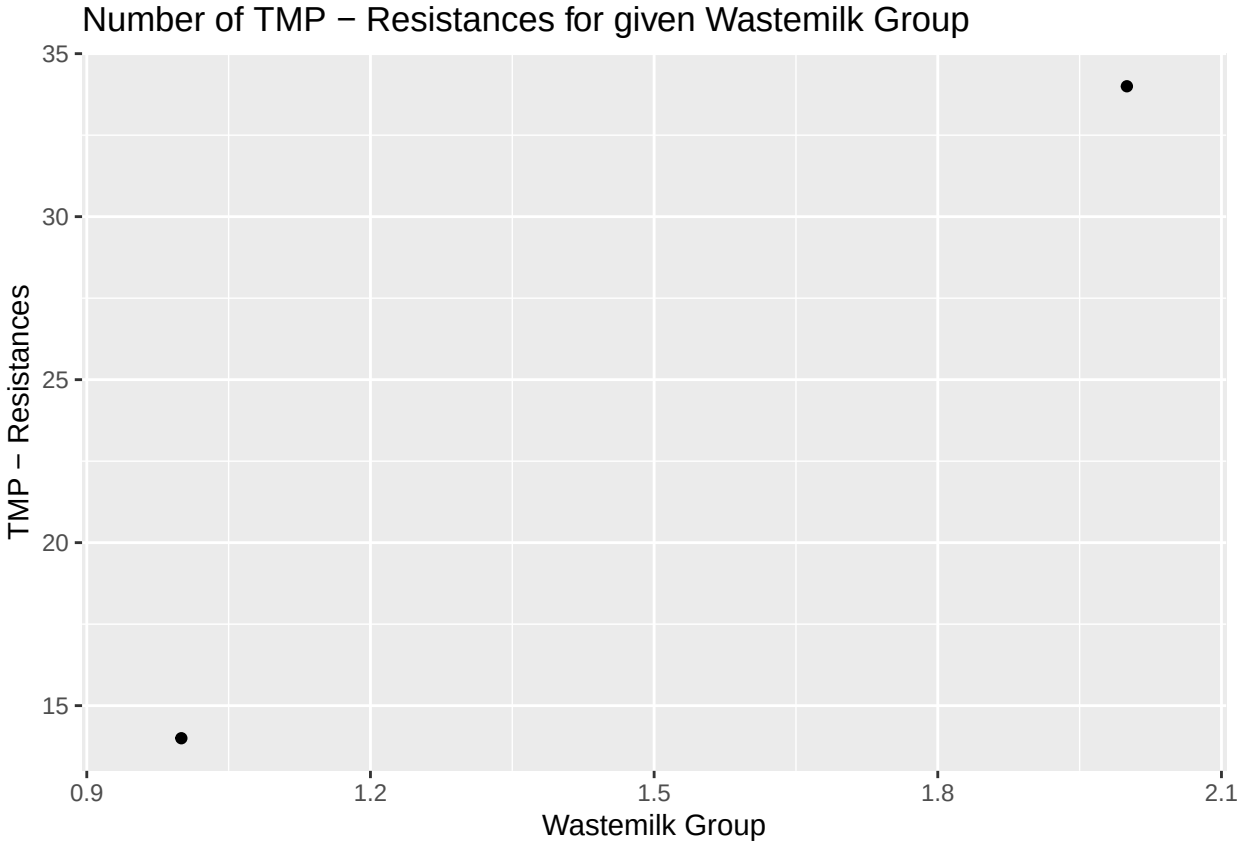

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



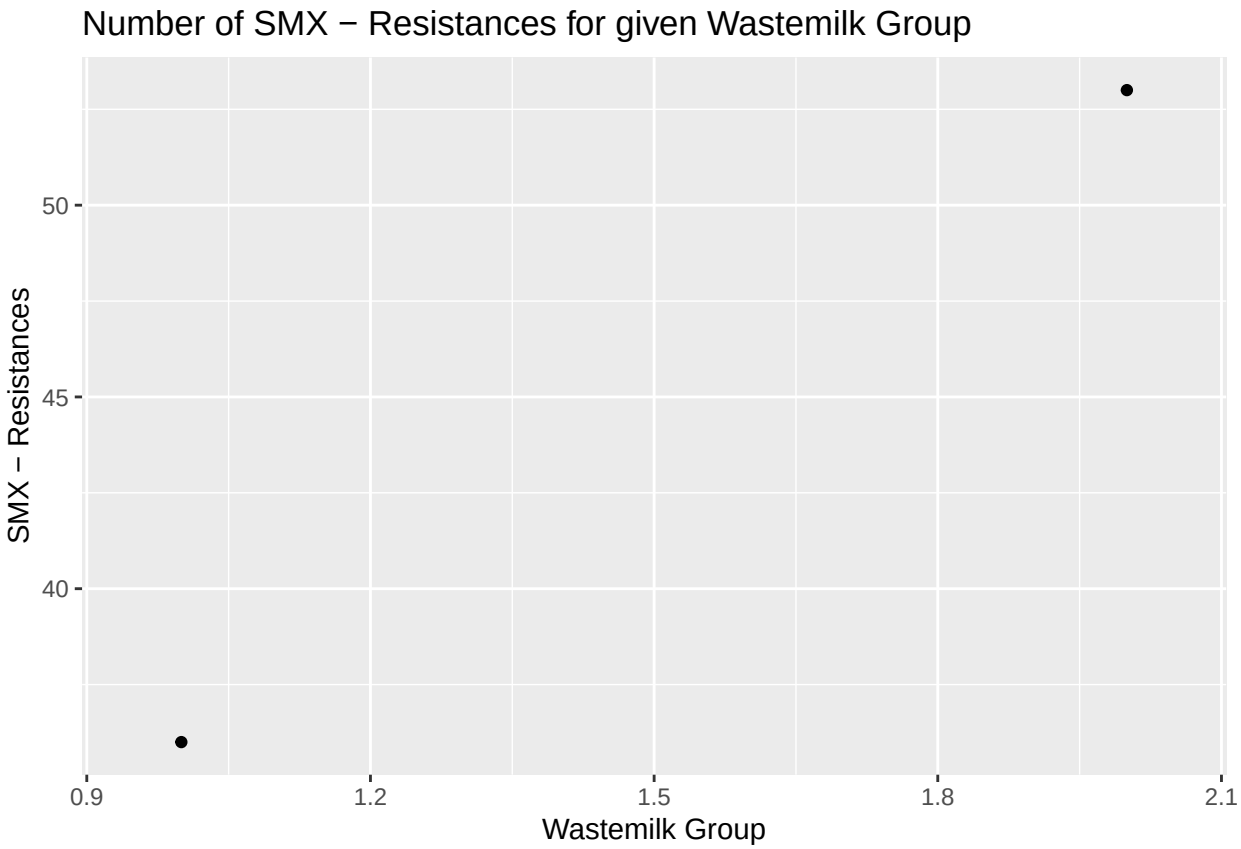

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



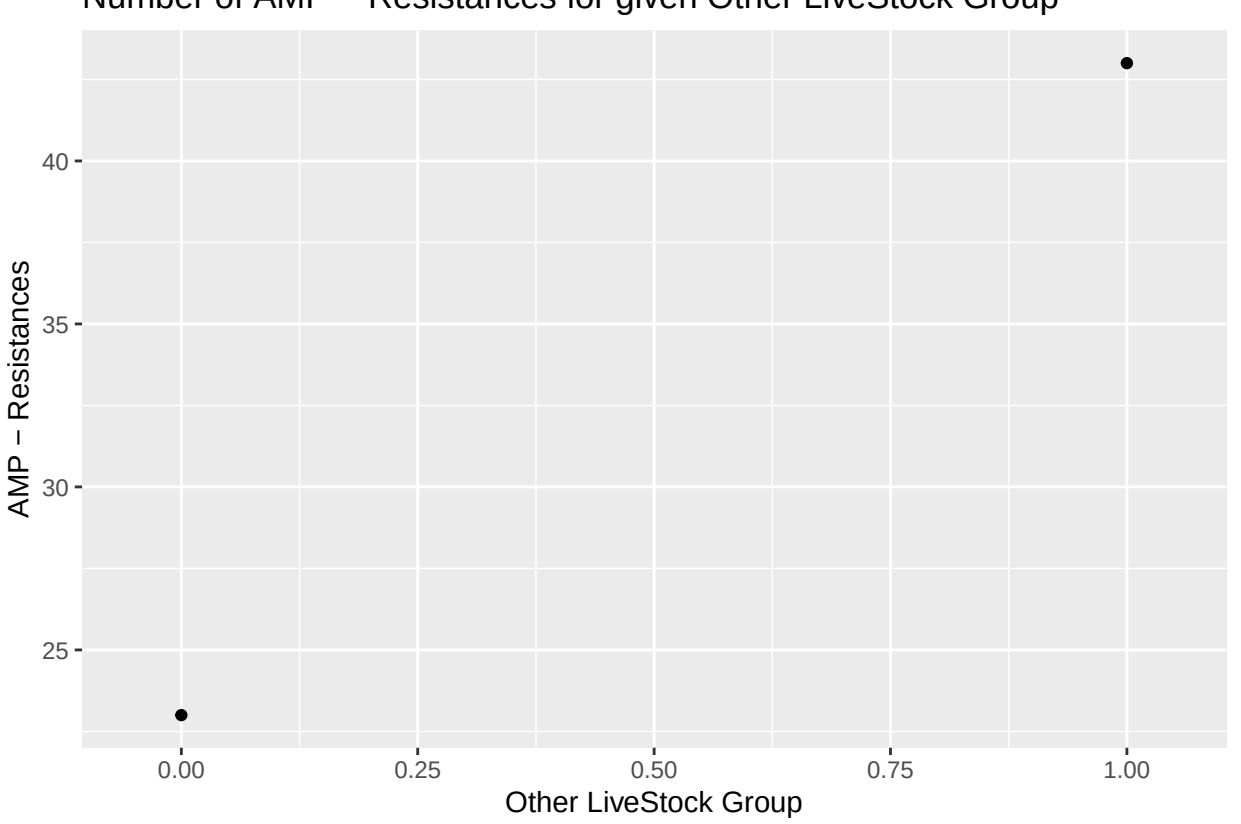

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



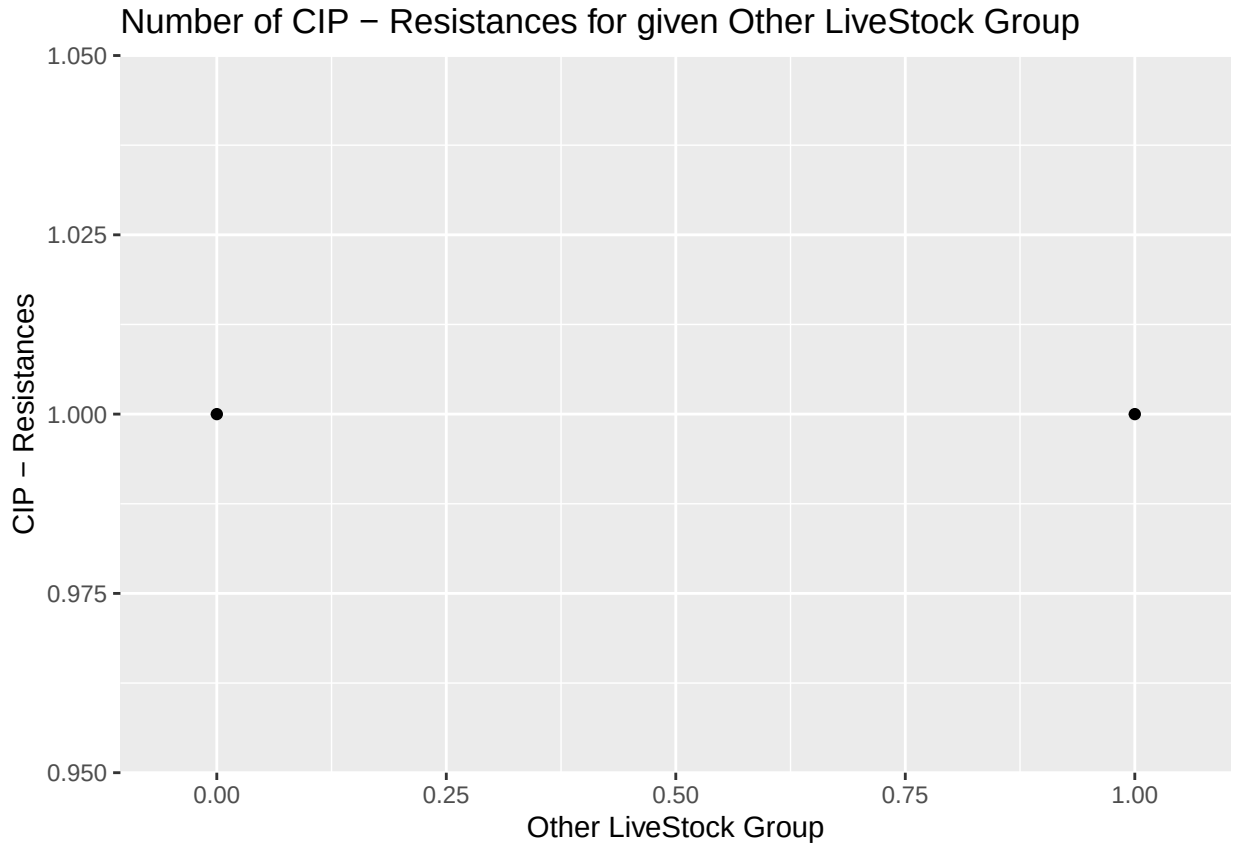

```
## [1] ""
## [1] "------------------------------------------------------"
```

```
## Saving 6.5 x 4.5 in image
```



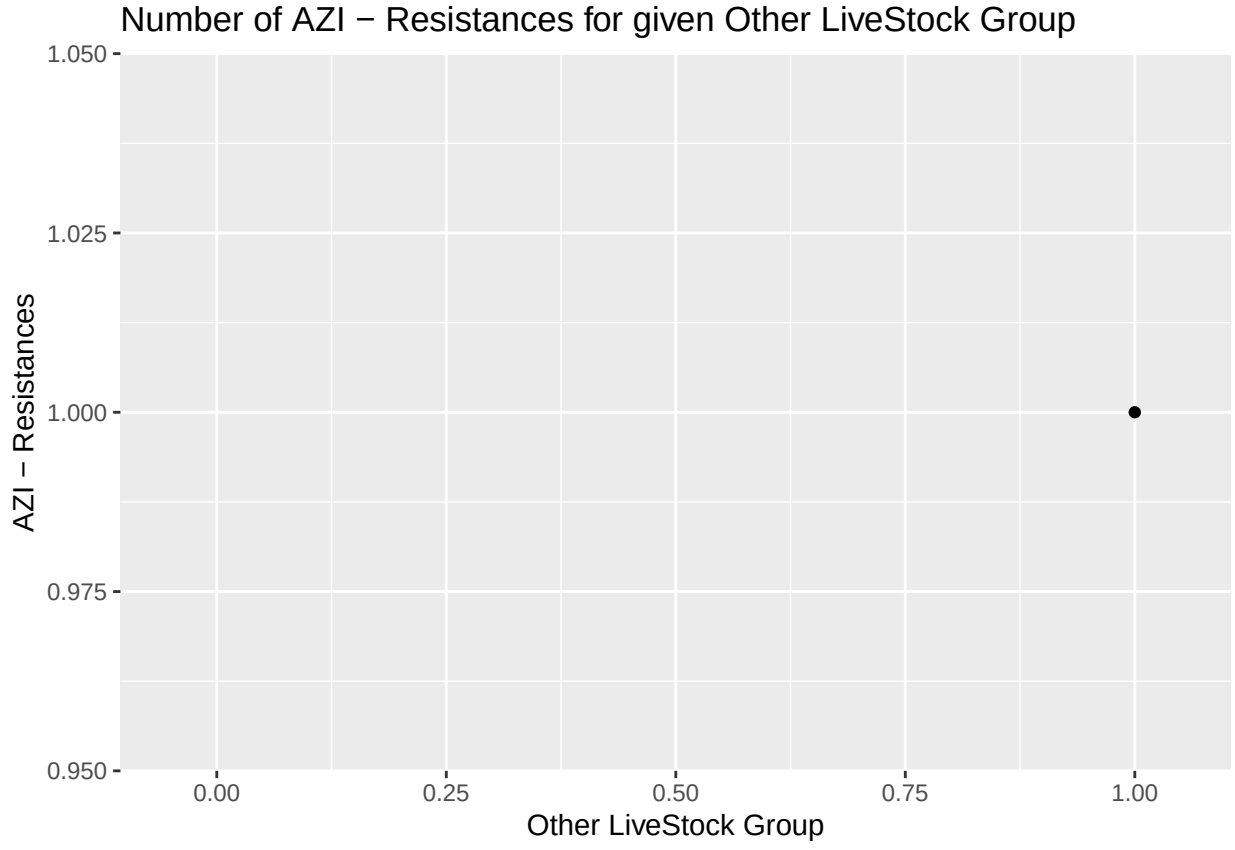

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



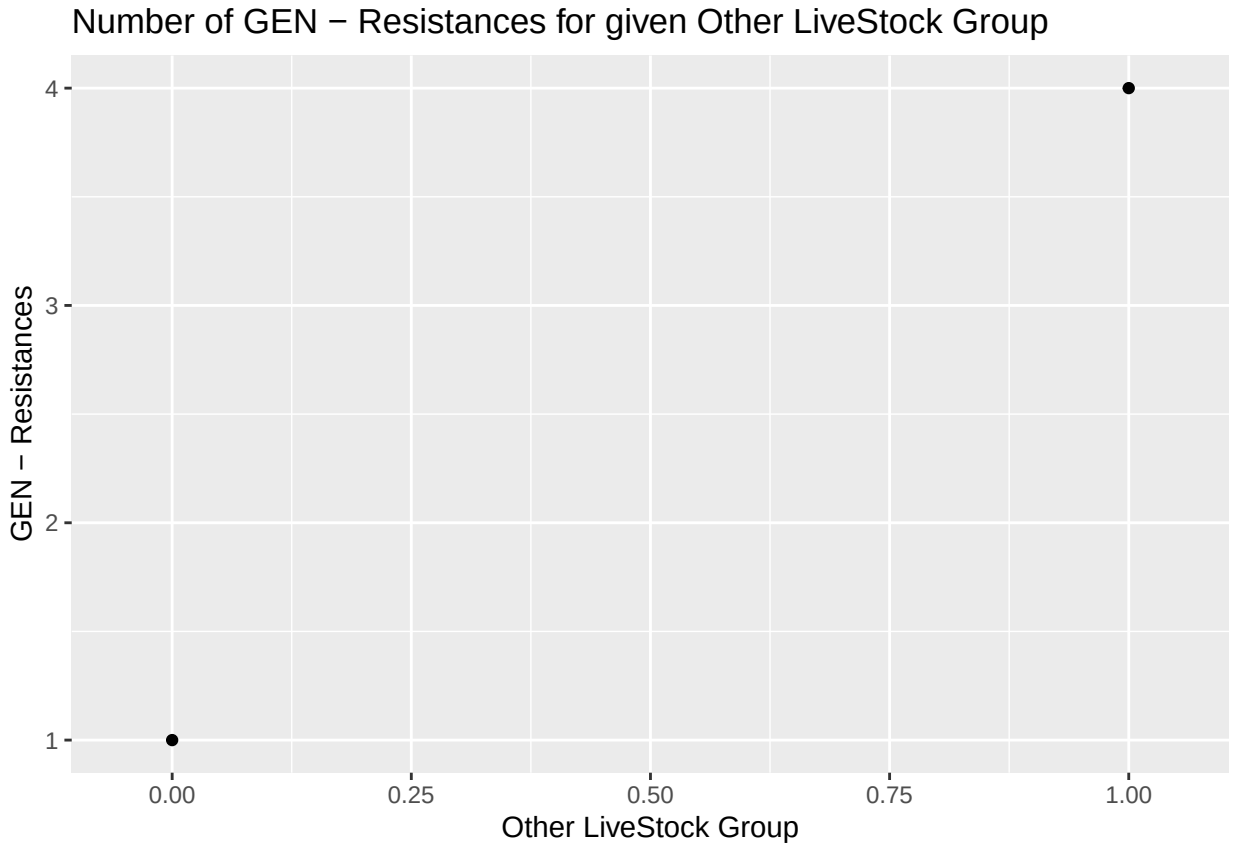

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



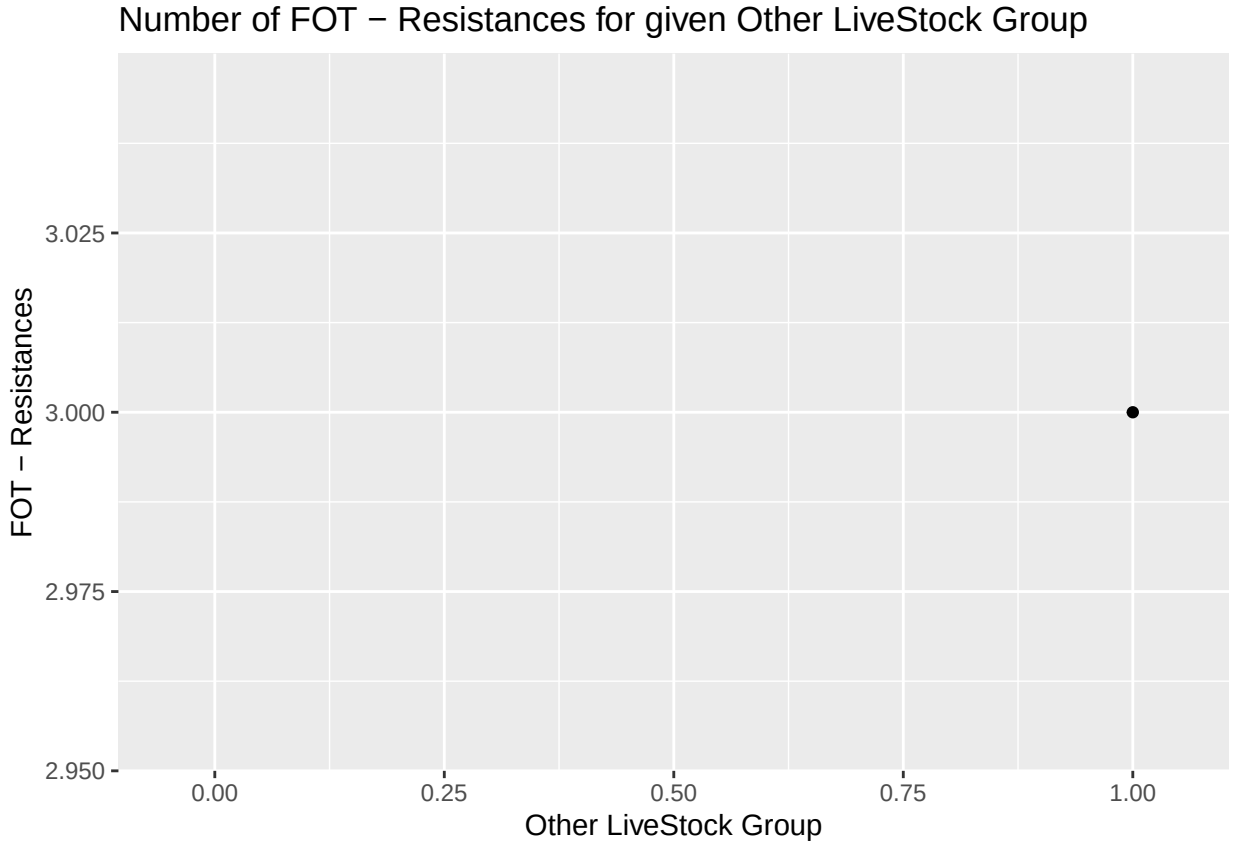

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



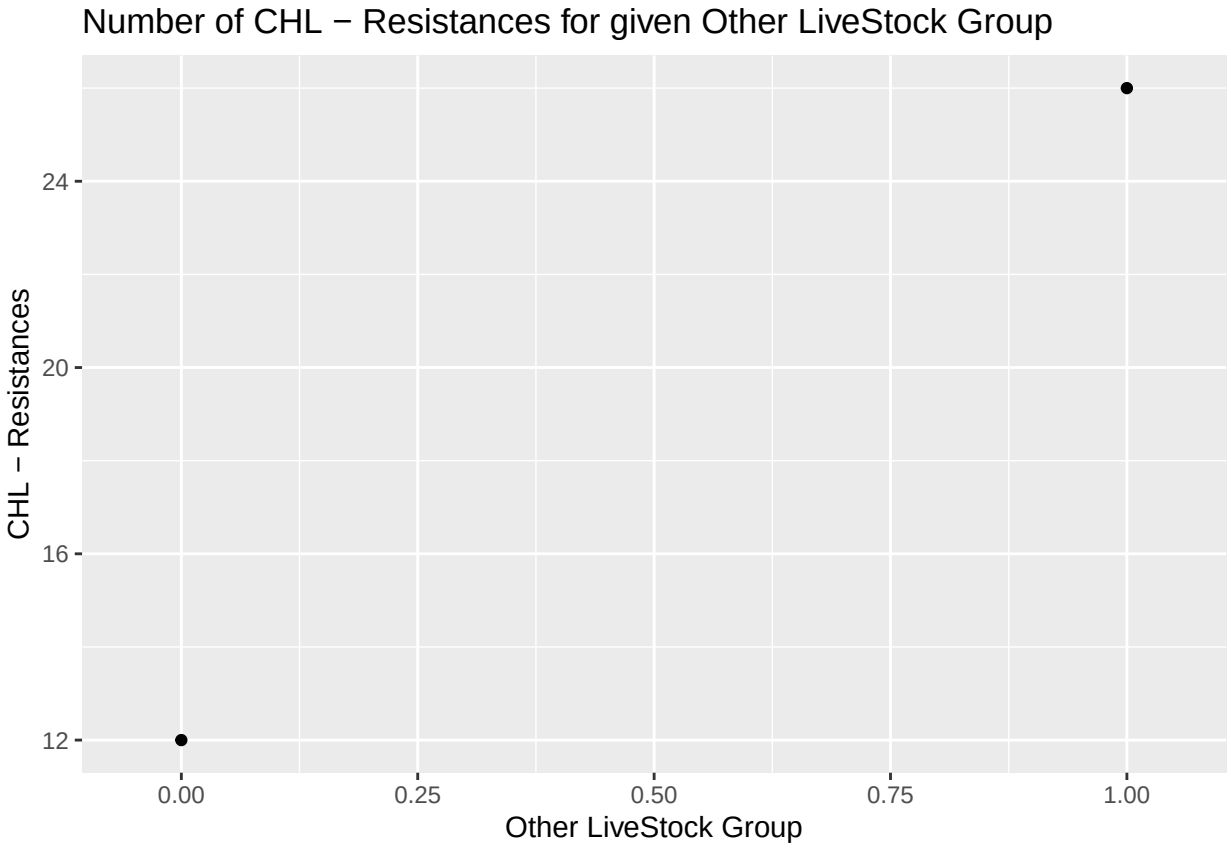

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



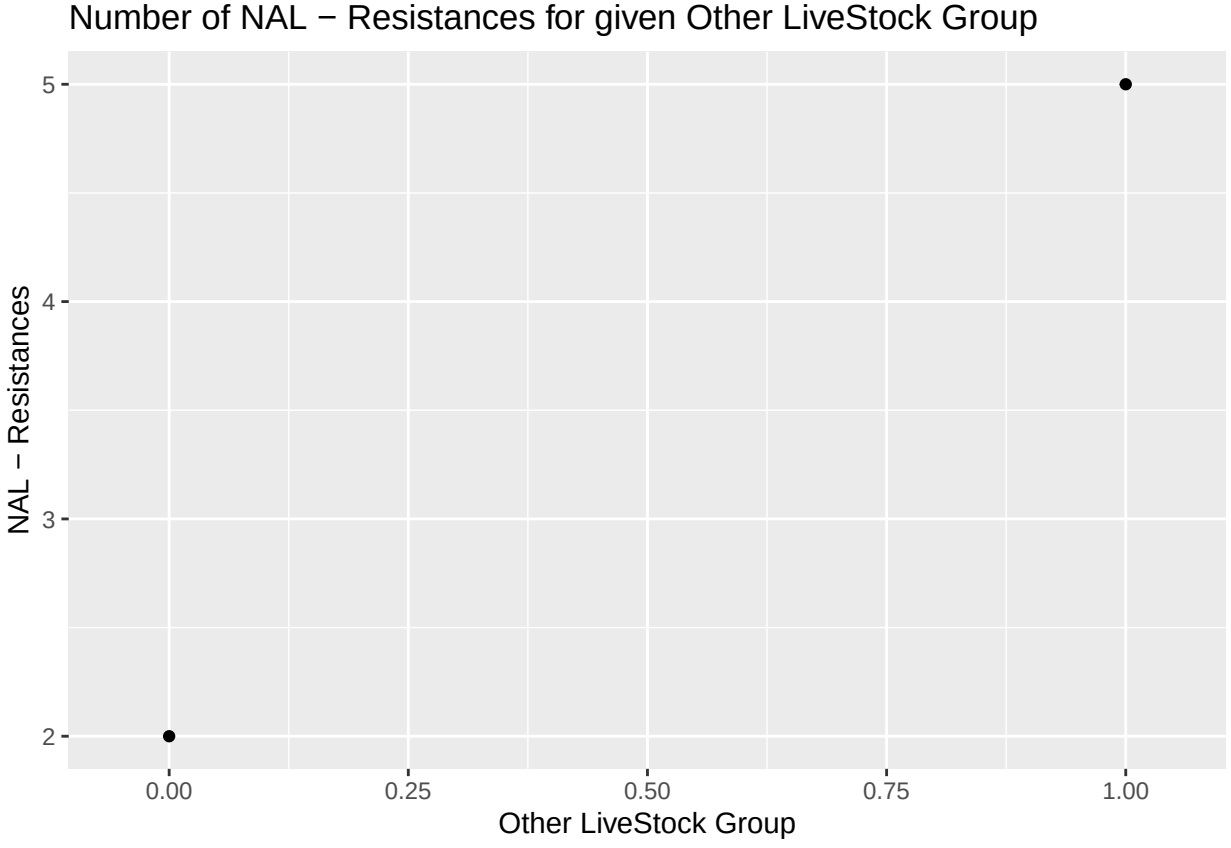

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



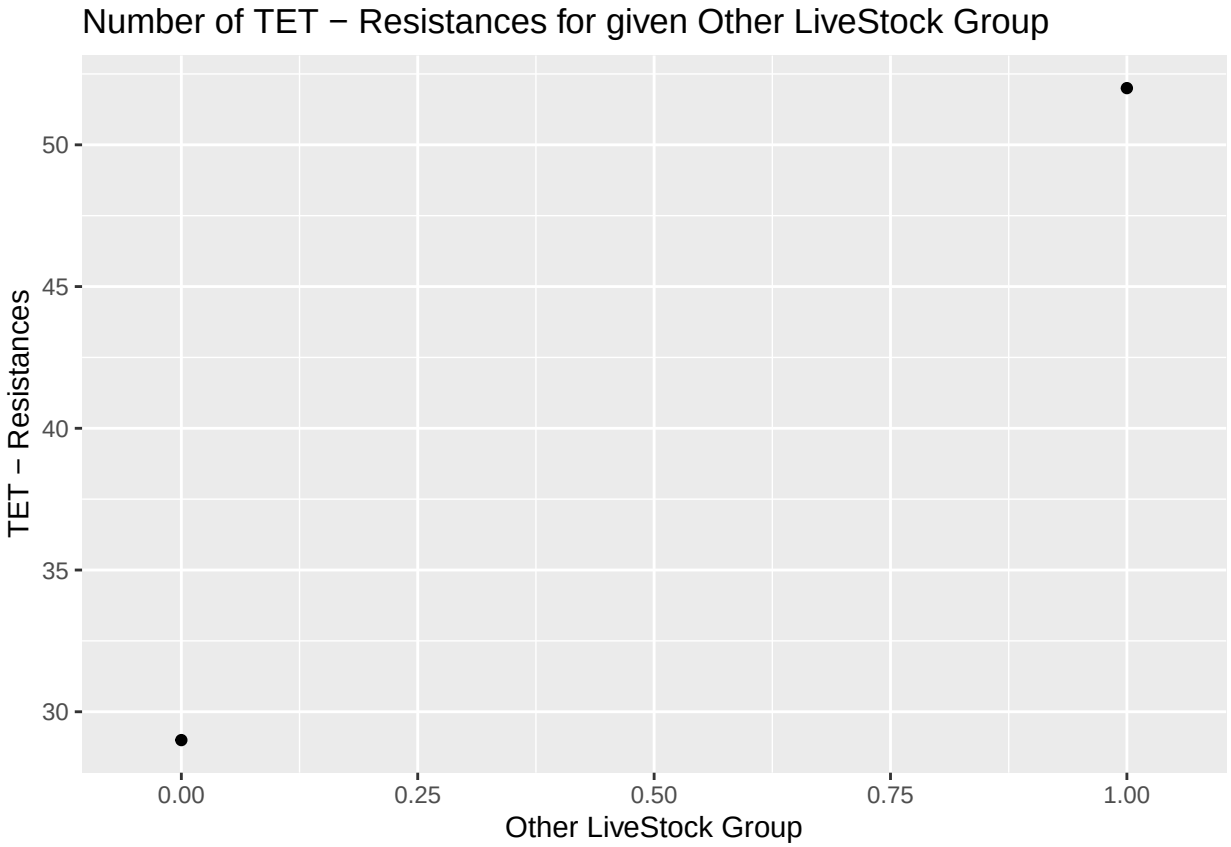

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



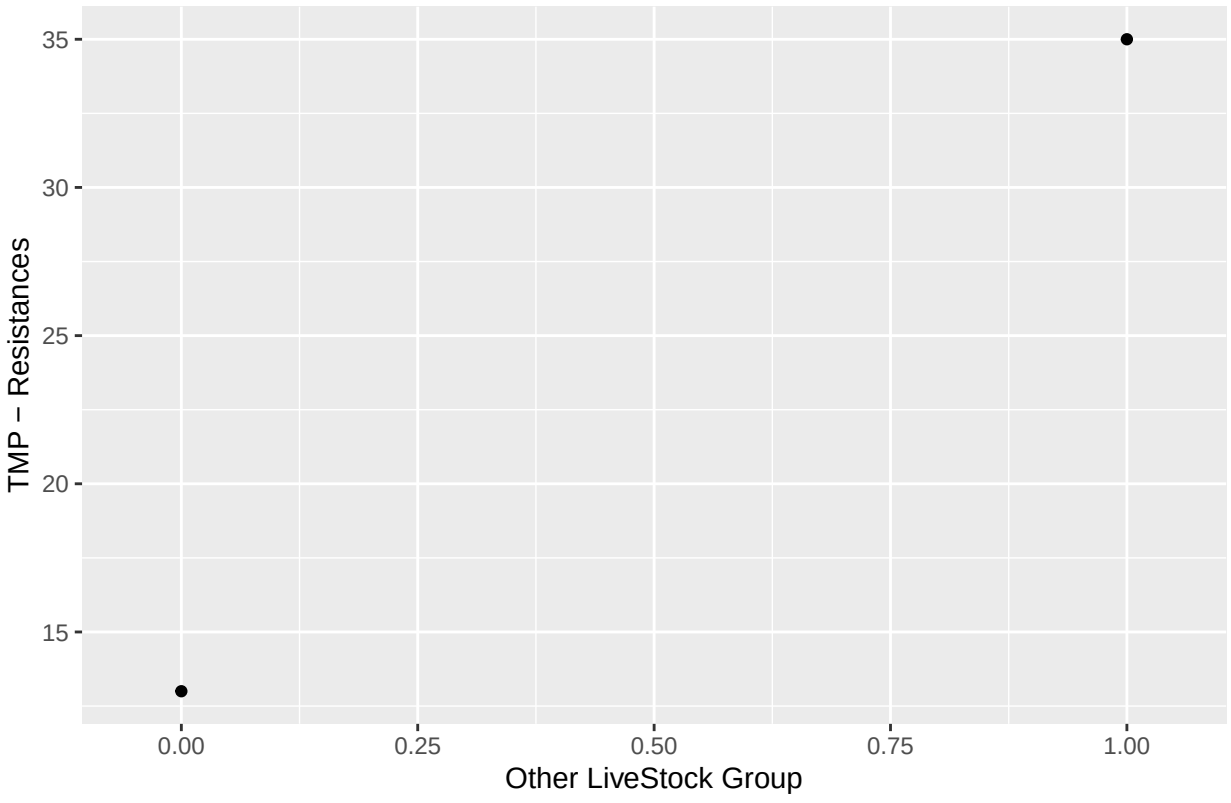

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



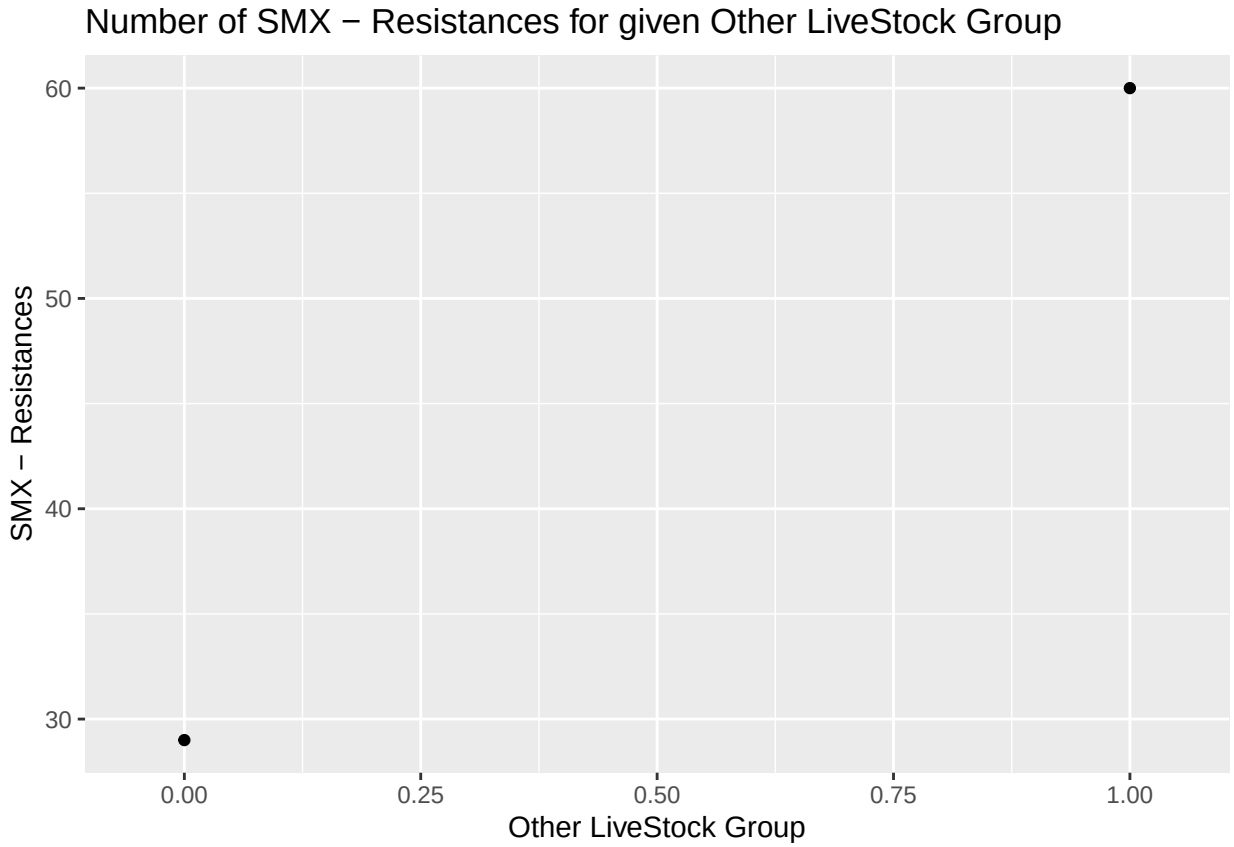

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



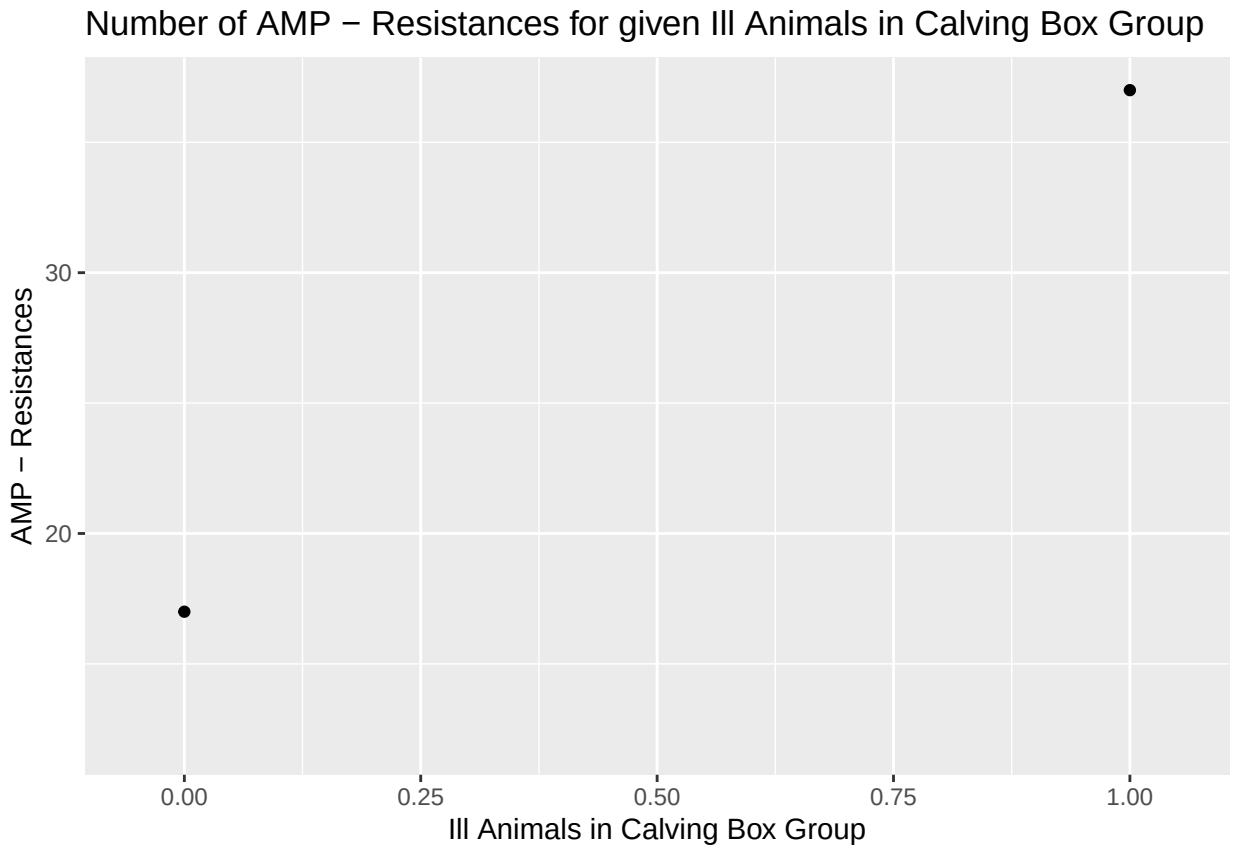

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



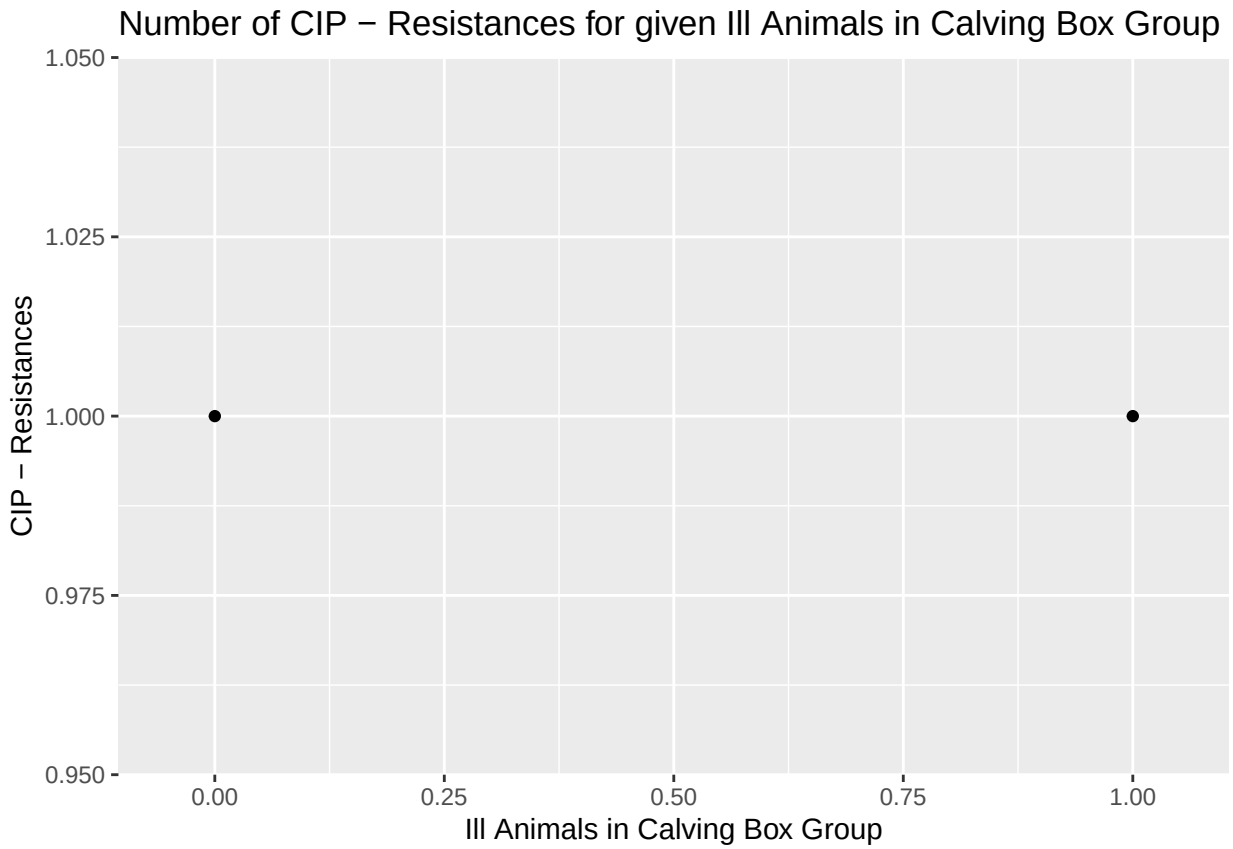

```
## [1] ""
## [1] "------------------------------------------------------"
```

```
## Saving 6.5 x 4.5 in image
```



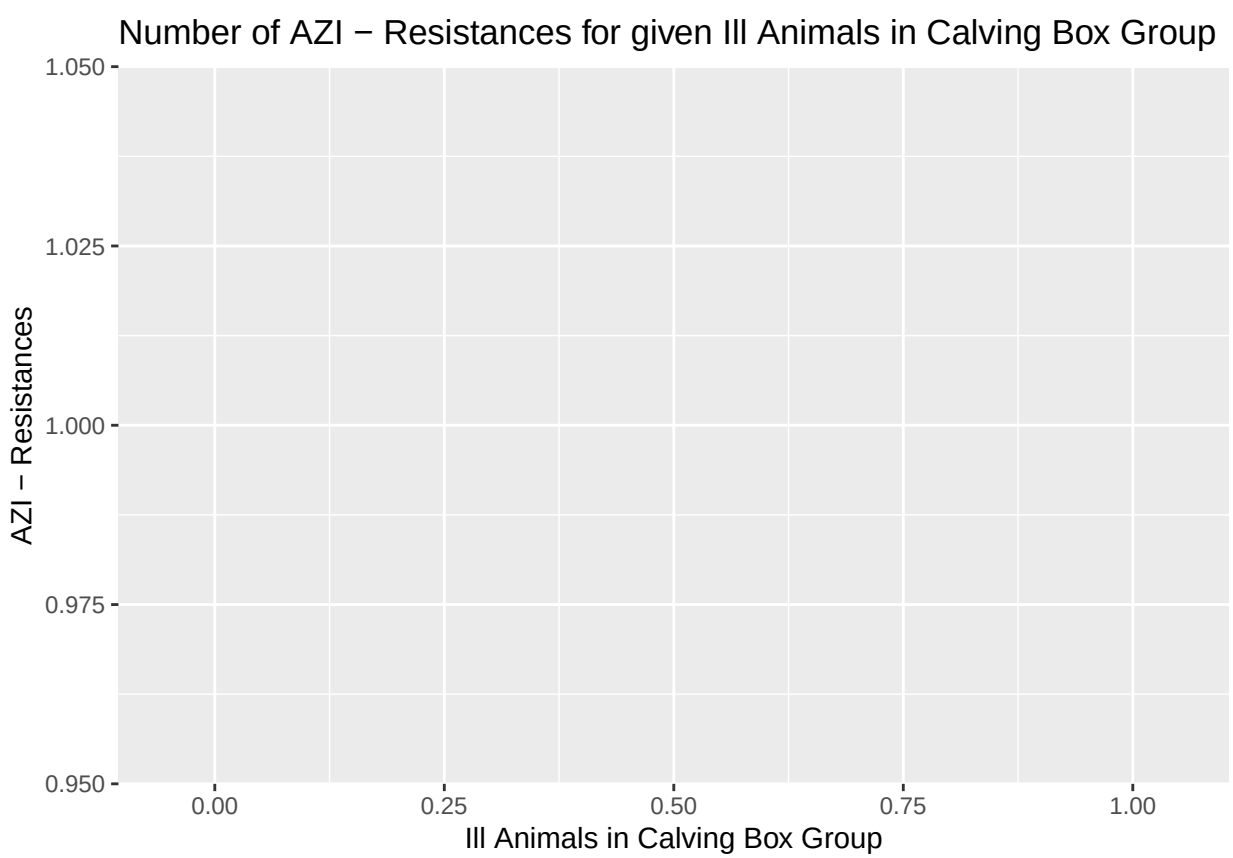

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



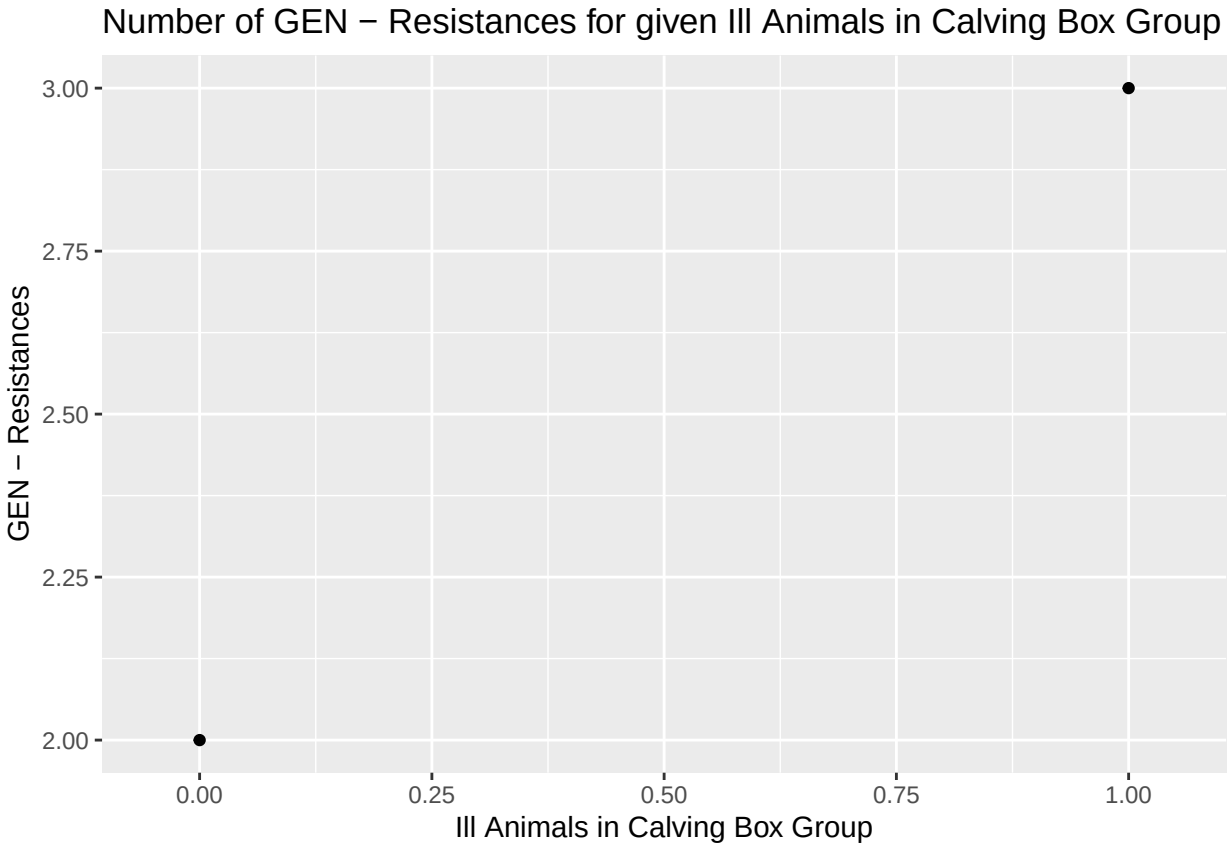

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



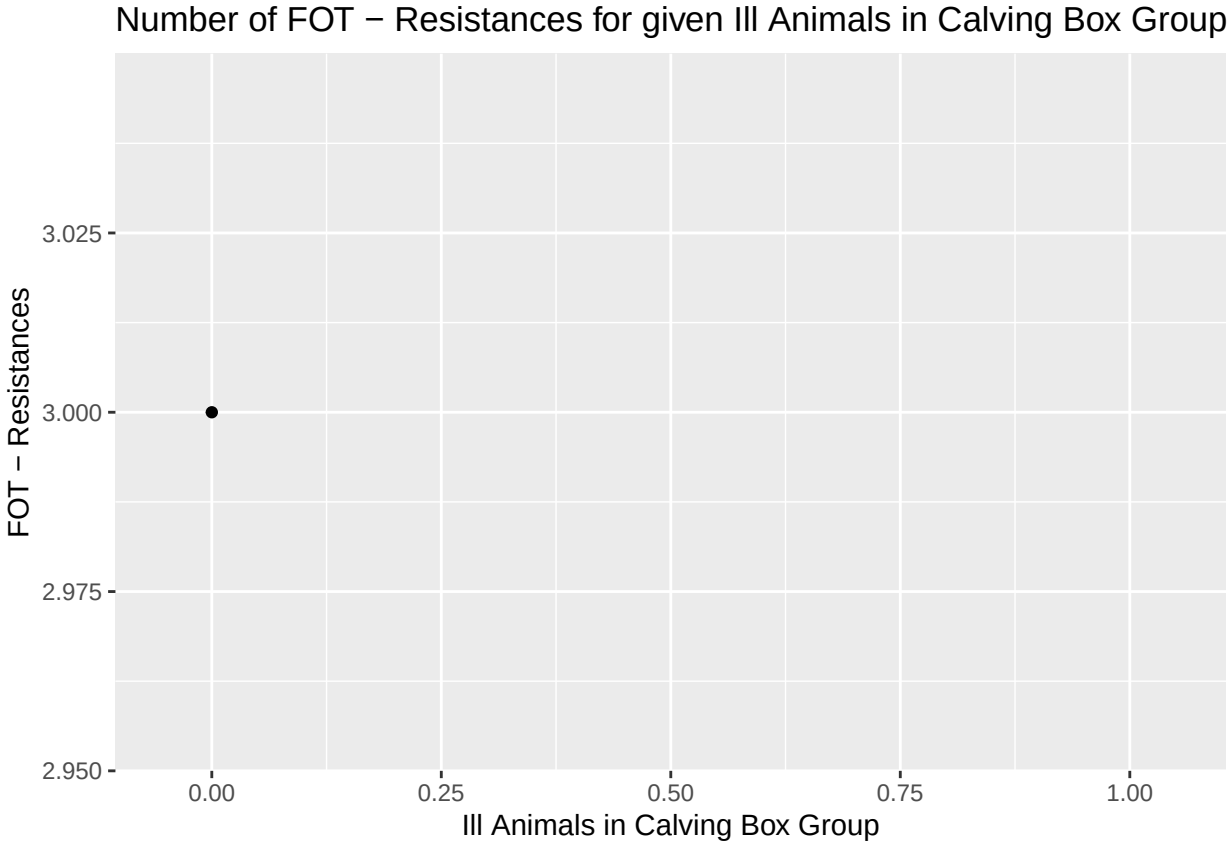

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



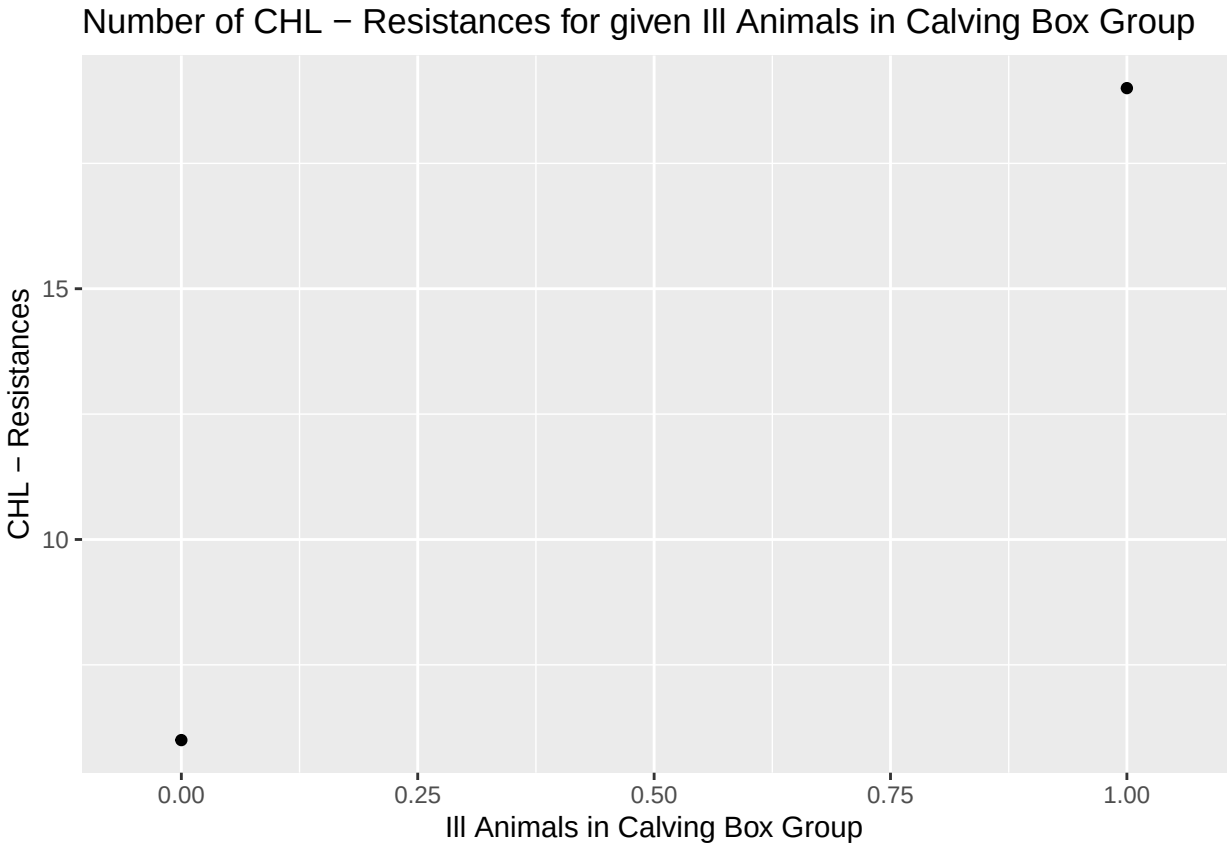

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



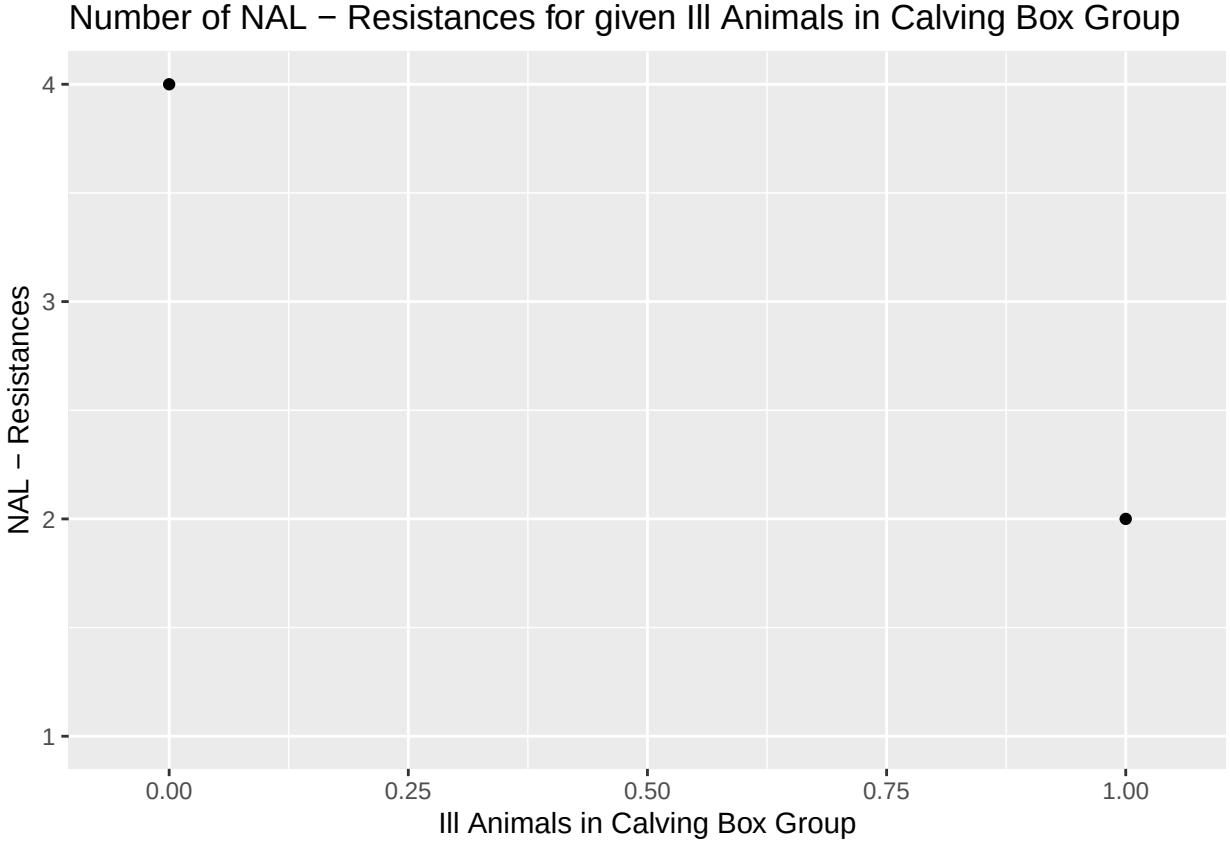

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



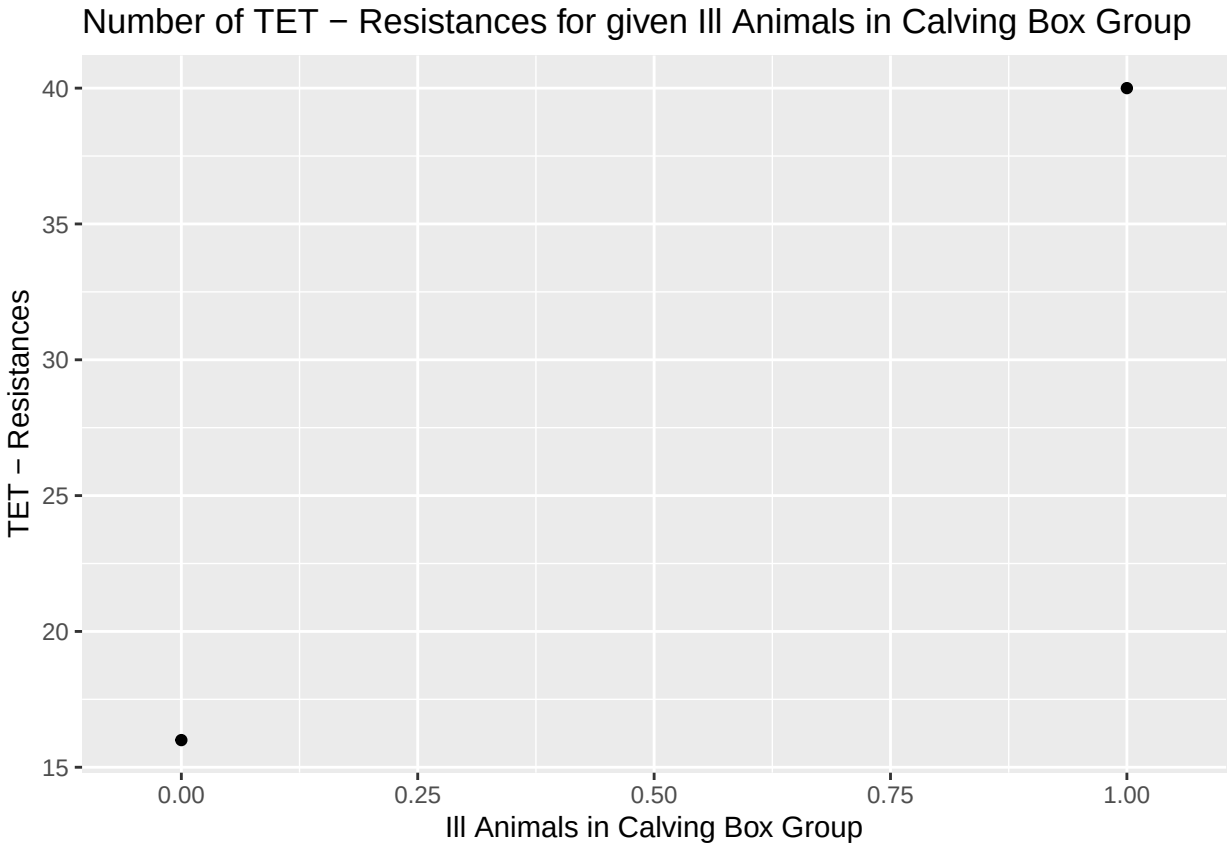

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



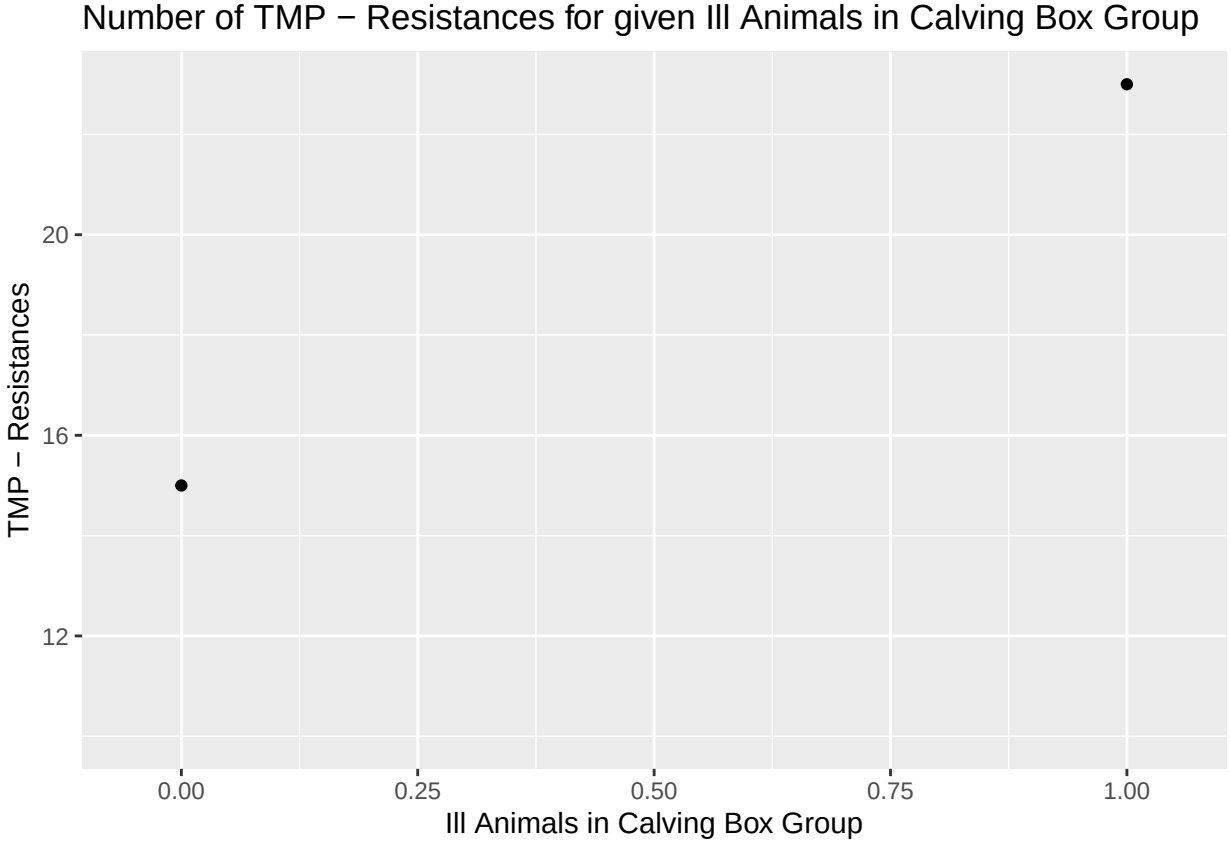

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



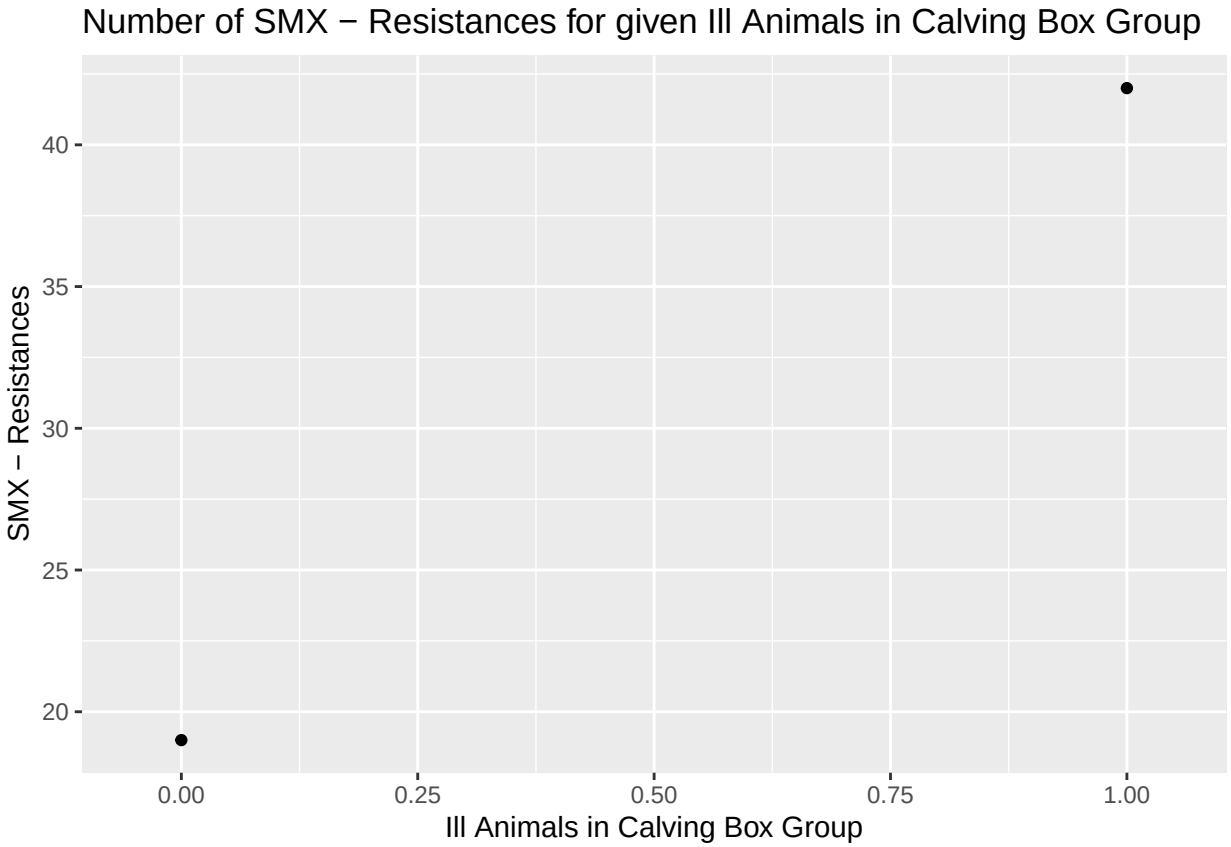

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



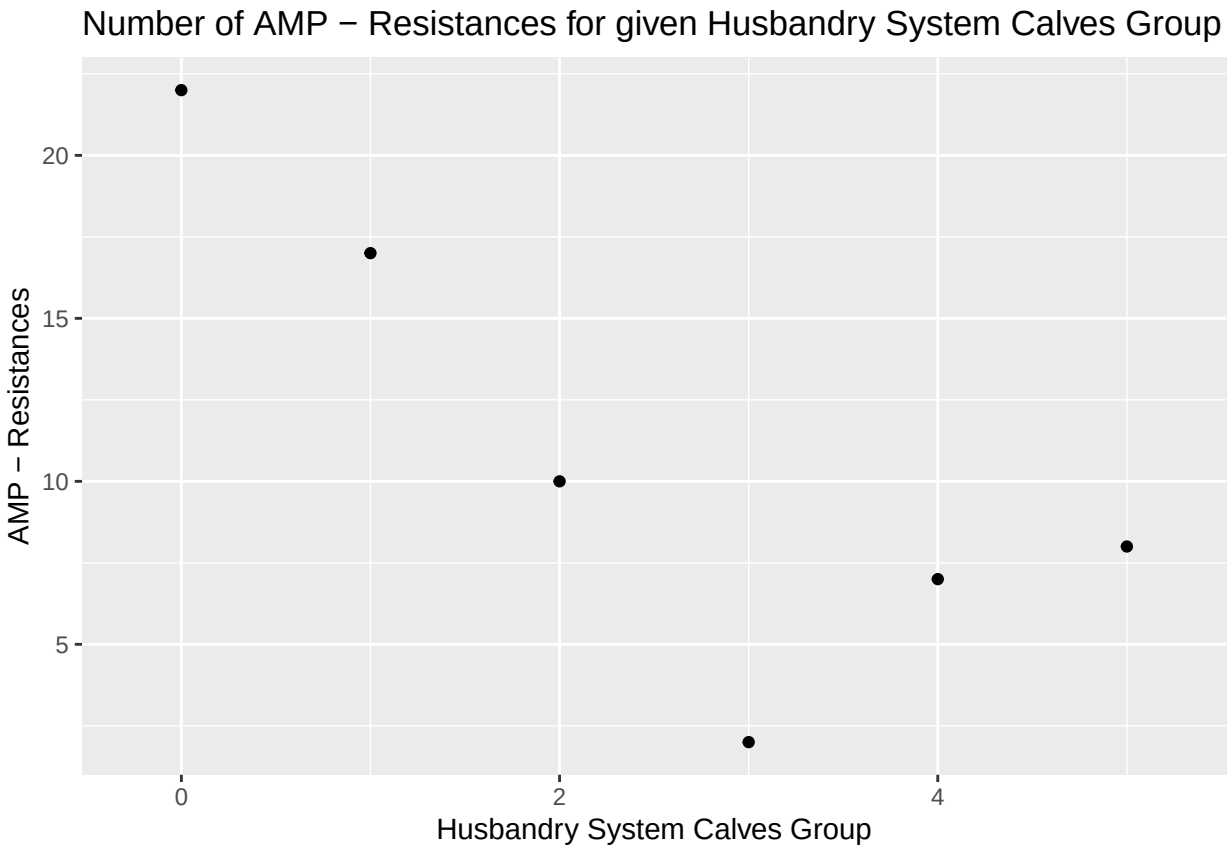

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



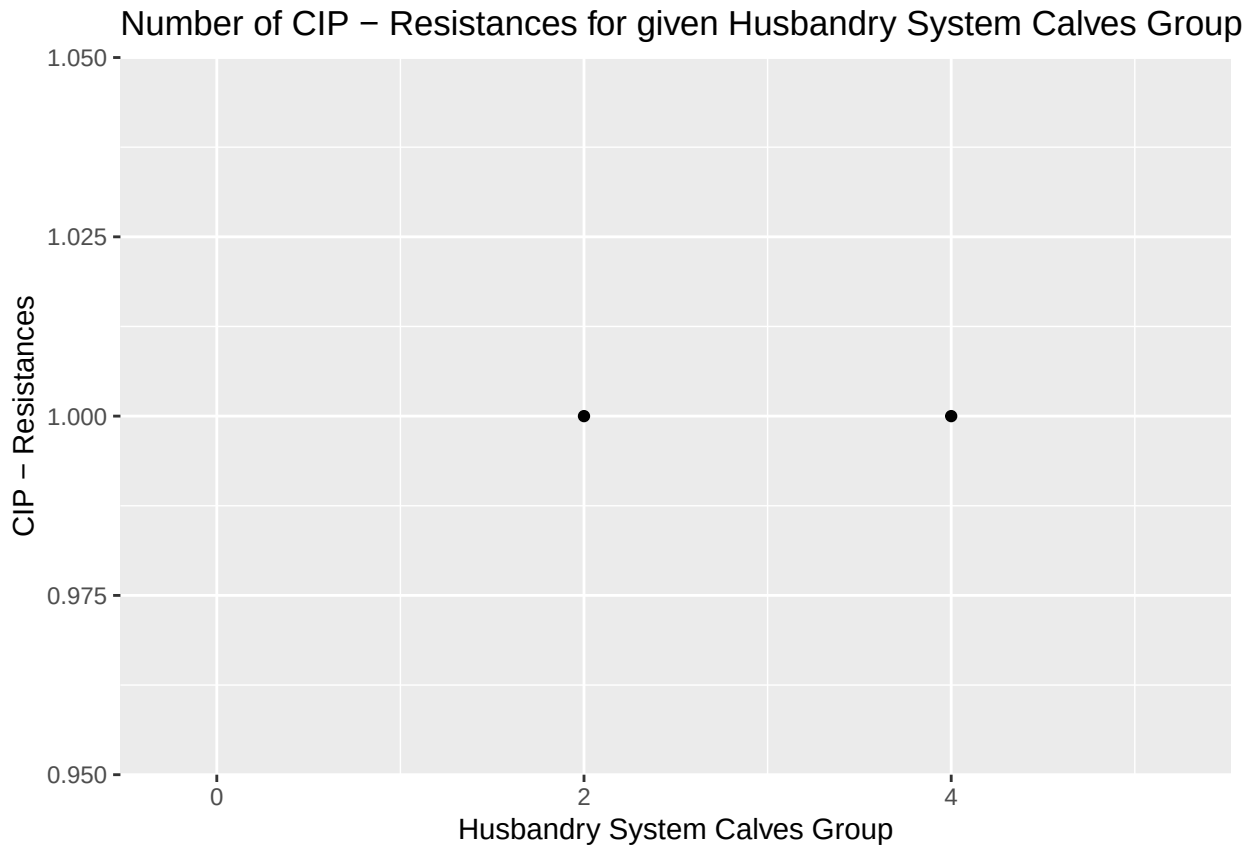

```
## [1] ""
## [1] "------------------------------------------------------"
```

```
## Saving 6.5 x 4.5 in image
```



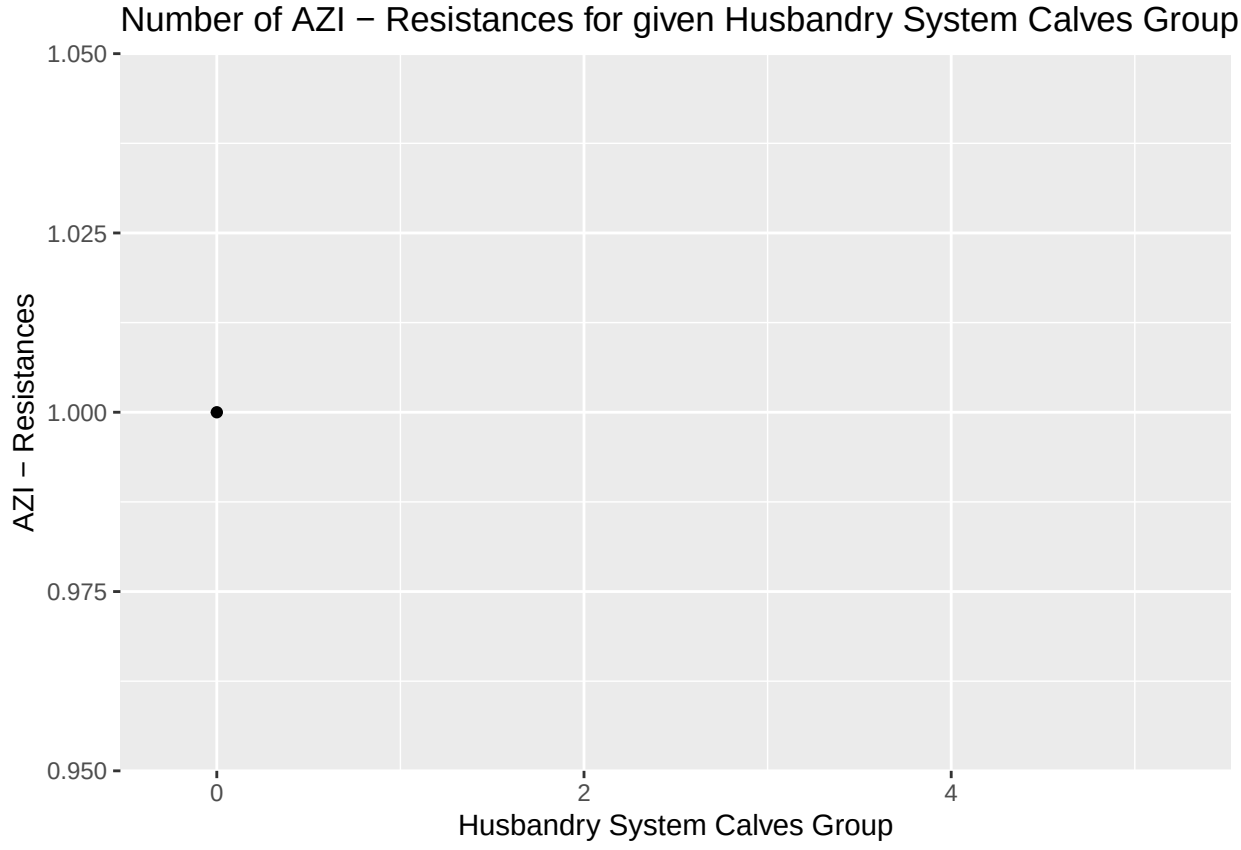

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



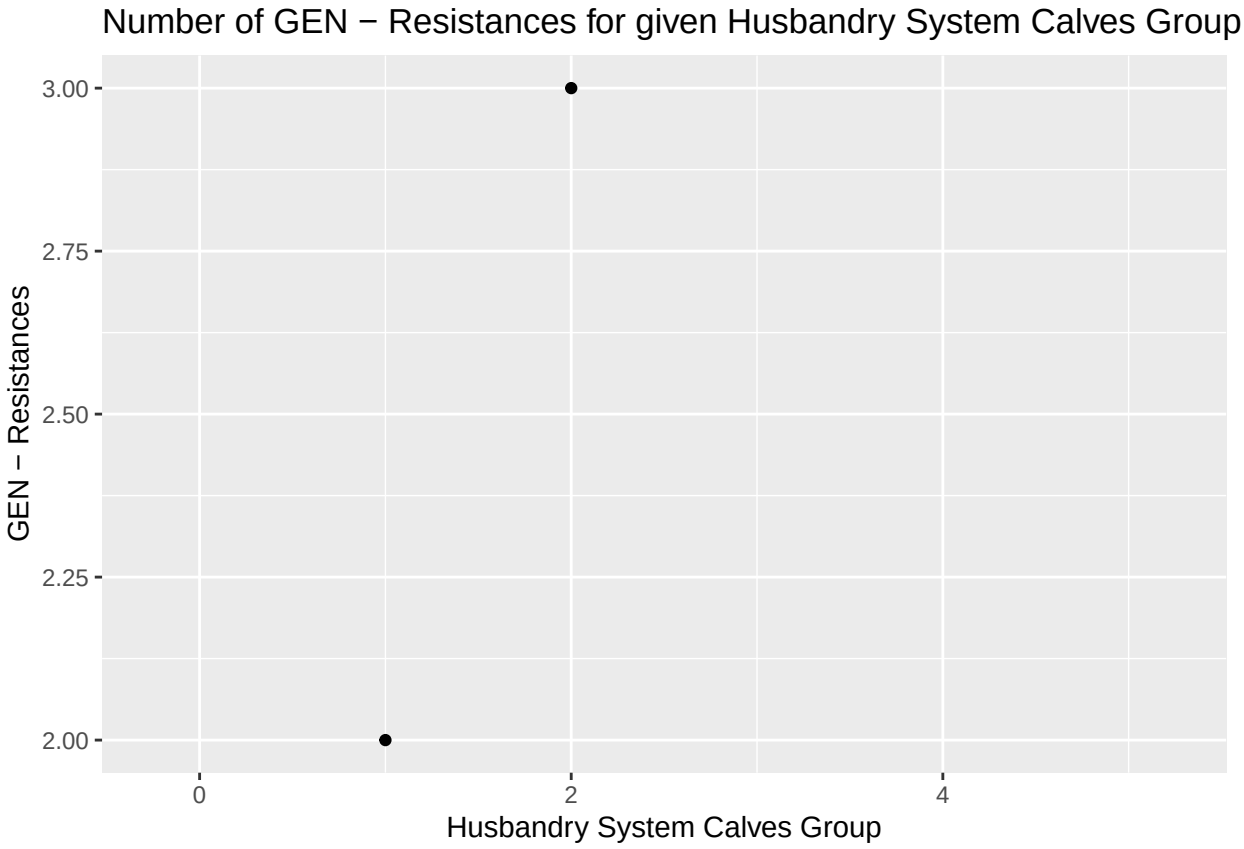

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



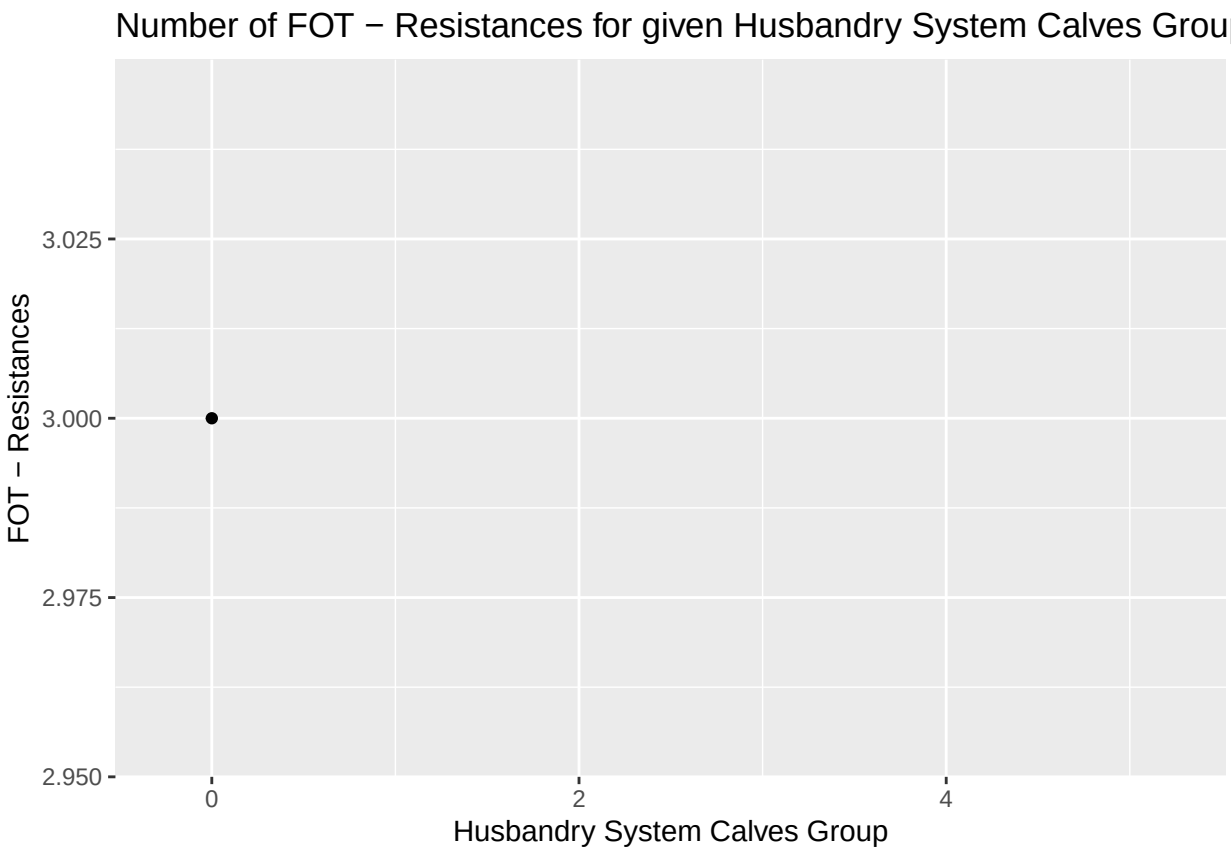

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



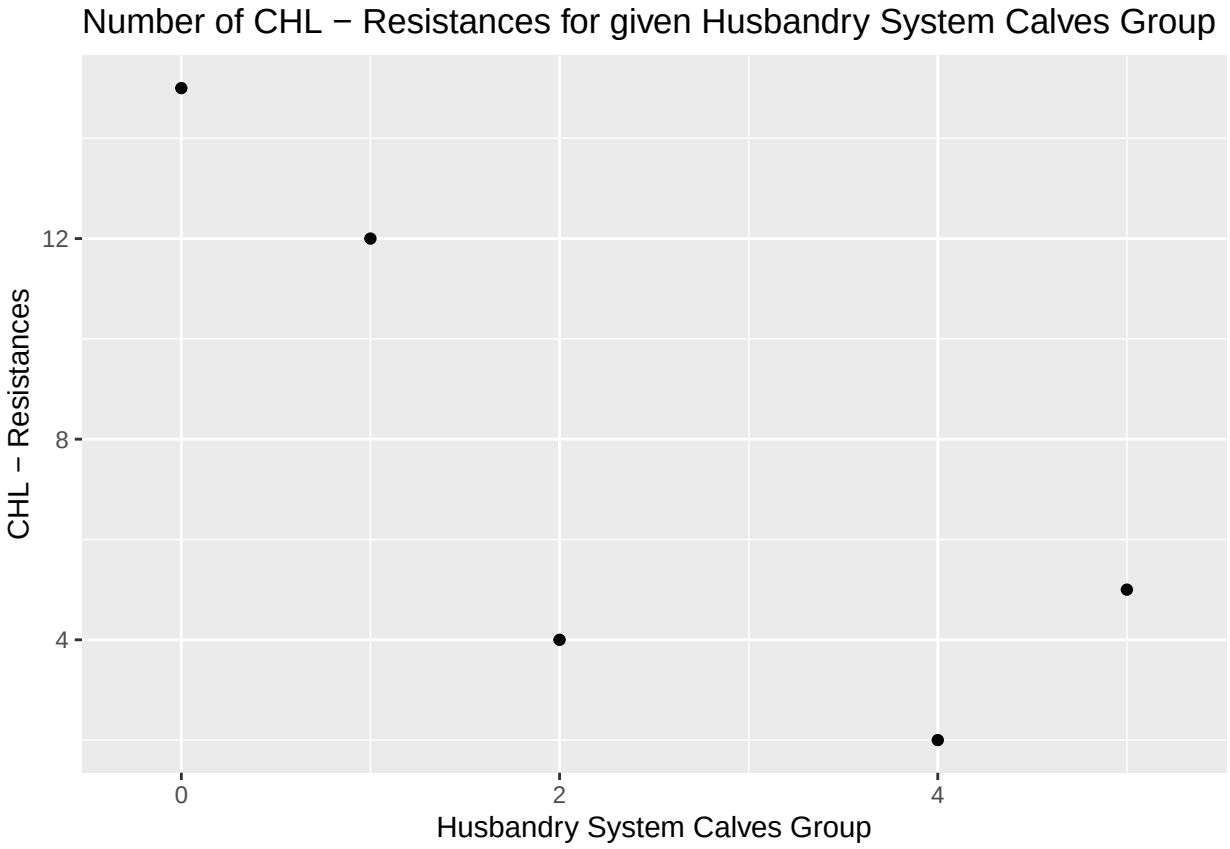

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



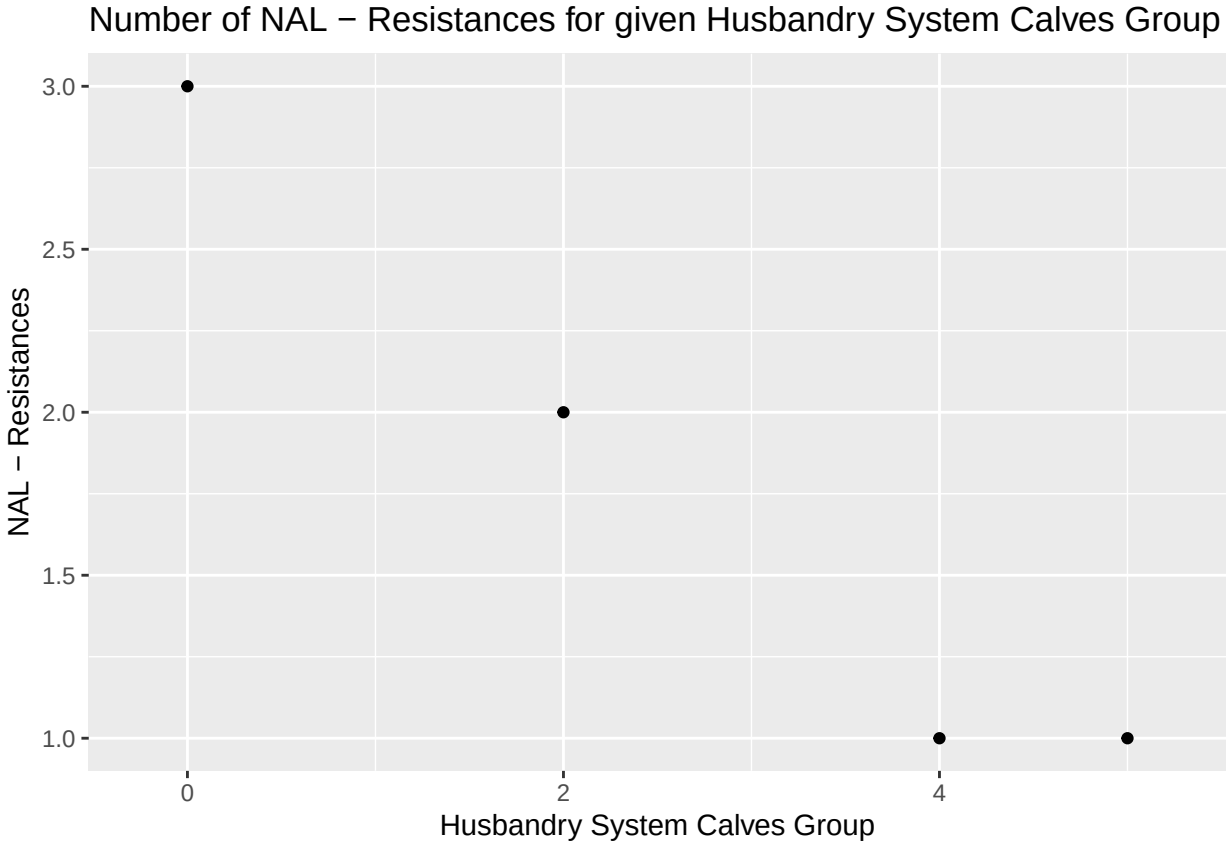

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



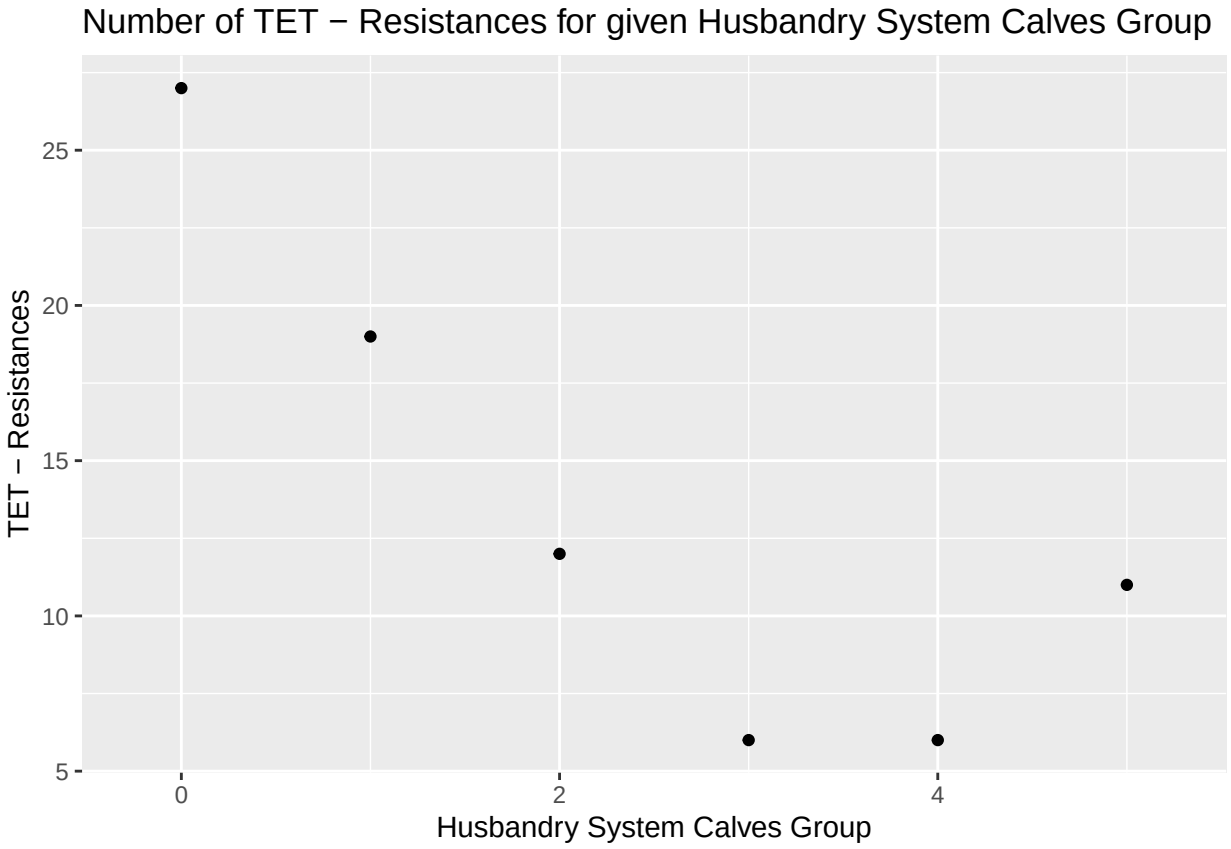

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



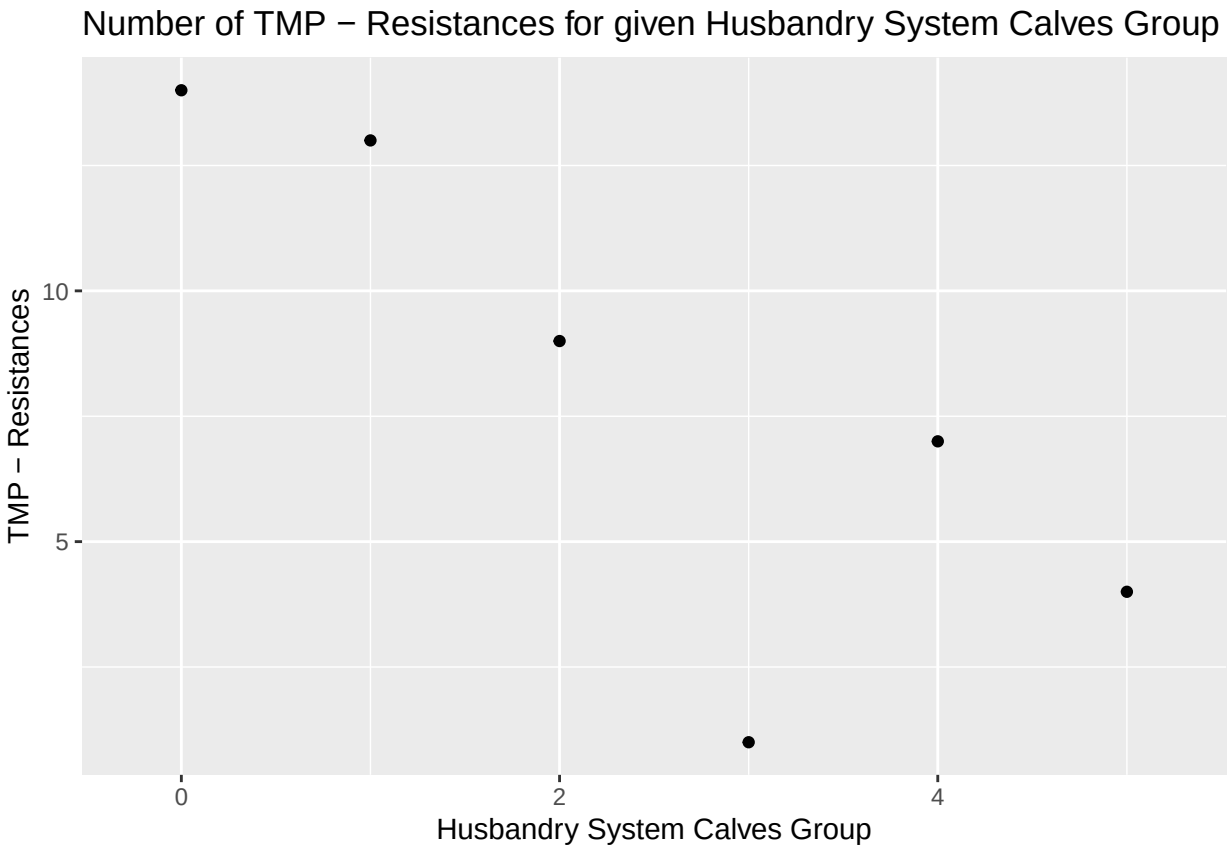

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```



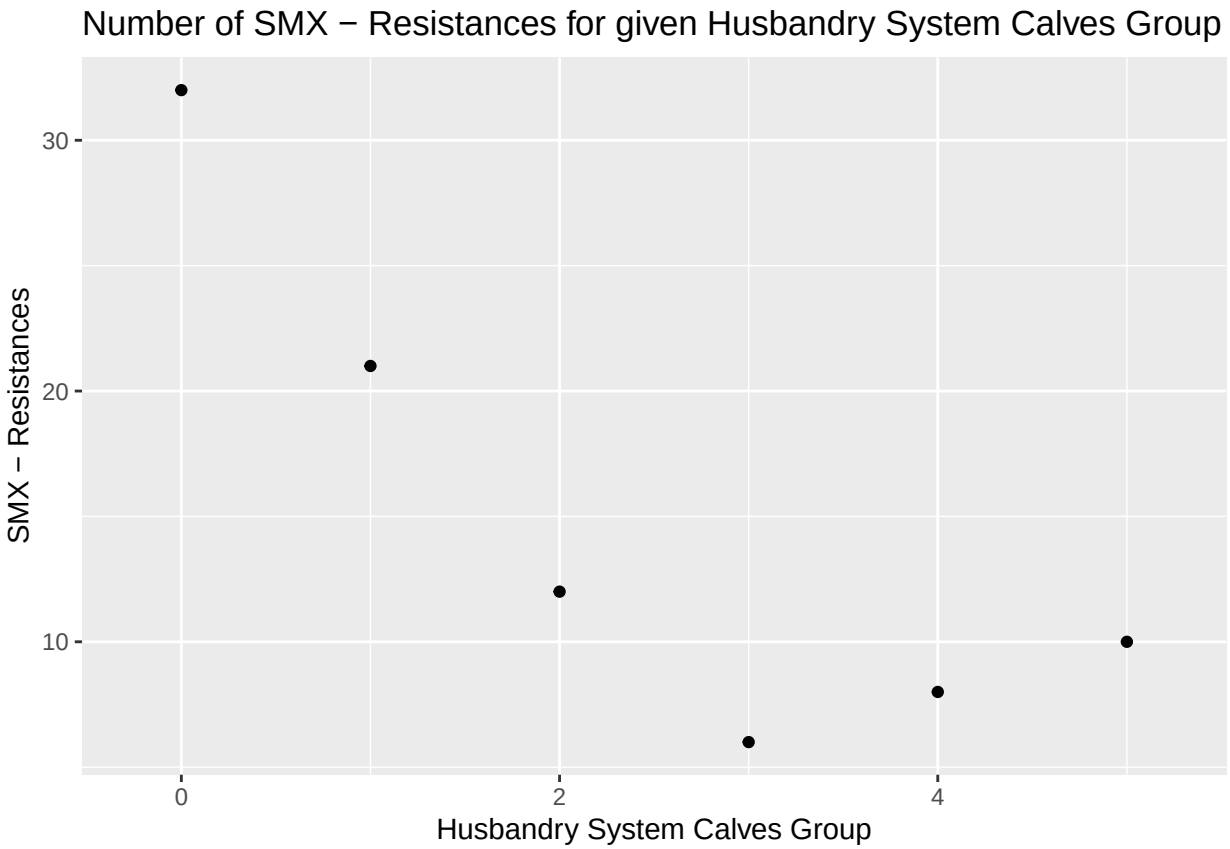

```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```




```
## [1] ""
```

```
## Saving 6.5 x 4.5 in image
```




```
## [1] ""
## [1] "------------------------------------------------------------"
```

Ungeschichtet: Resistenzen scheinen zu

- steigen mit MY (das sahen wir schon aus den Verteilungen), OLS.group, tendenziell auch IAC.group
- fallen bis HSC.group = 3, dann wieder etwas zu steigen (die Steigung von $4 \mapsto 5$ scheint einleuchtend, da 5=0+2 und 4=1+2; man könnte $4 \leftrightarrow 5$ im plot vertauschen)
- jedenfalls sind die Trends klarer als aus den Verteilungen. Eine Regression sagt nochmal mehr