Centro de Estatística Aplicada

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Sumário

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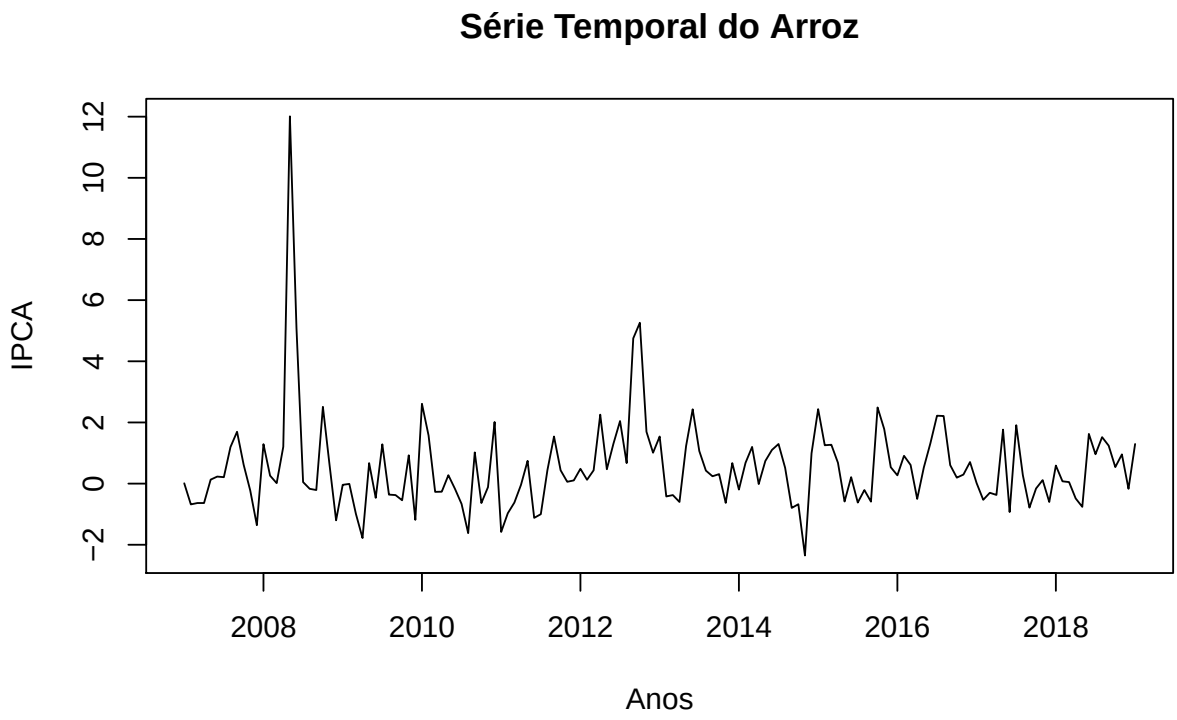
Análise Descritiva

```
#setwd("C:\\Users\\Rodrigo Araujo\\Documents\\IME-USP\\CEA 1\\dados")
#data = read_xlsx("IPCA_DADOS_AGRUPADOS.xlsx", sheet = 1)

setwd("C:\\Users\\Rodrigo Araujo\\Documents\\IME-USP\\CEA 1\\dados")
data = read_xlsx("IPCA_DADOS_AGRUPADOS.xlsx", sheet = 1)

data$Data <- as.Date(data$Data)
head(data)
```

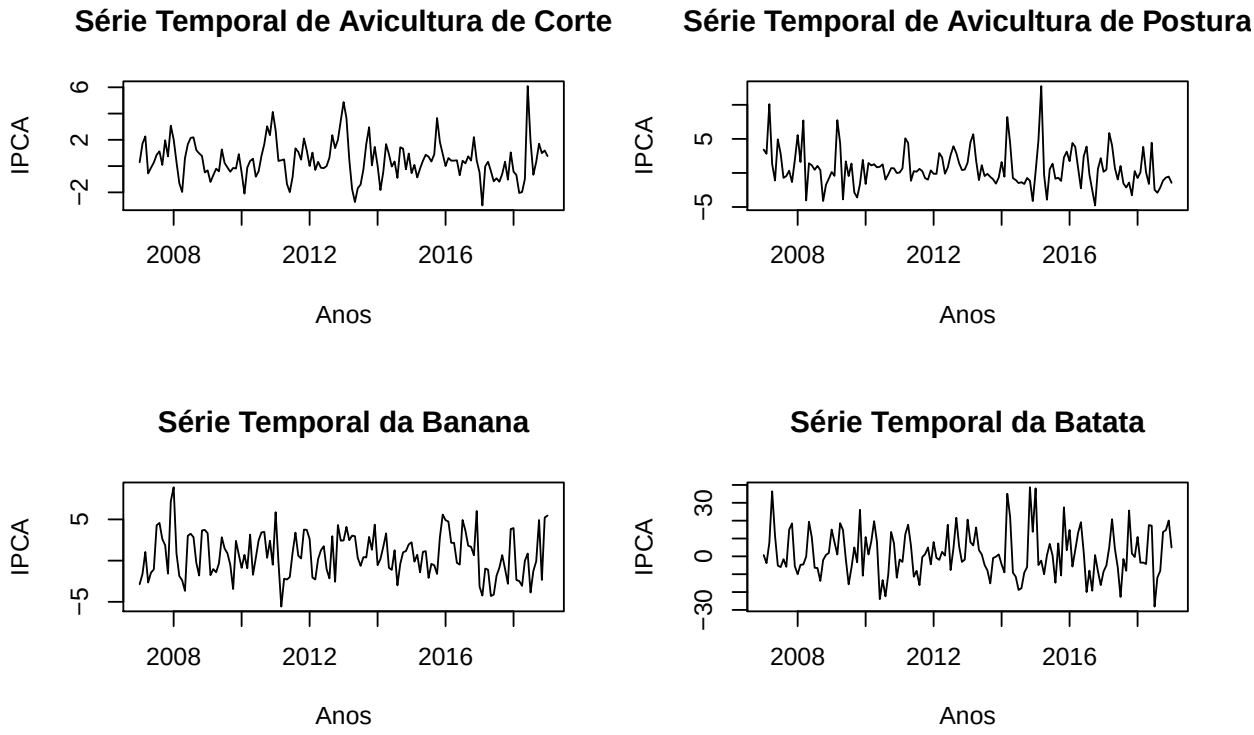
```
## # A tibble: 6 x 24
##   Data        Arroz `Avicultura de ~ `Avicultura de ~ Banana Batata
##   <date>      <dbl>            <dbl>            <dbl>  <dbl>  <dbl>
## 1 2007-01-01  0.01             0.295             3.43  -2.86   0.75
## 2 2007-02-01 -0.68             1.71              2.82  -1.62  -3.83
## 3 2007-03-01 -0.635            2.26             10.1    1.05   7.61
## 4 2007-04-01 -0.635           -0.56              1.31  -2.65  36.4
## 5 2007-05-01  0.13            -0.13             -1.11  -1.46  11.6
## 6 2007-06-01  0.230            0.27              4.93  -1.07  -5.17
## # ... with 18 more variables: Bovinocultura <dbl>, `Cacau e produtos` <dbl>,
## #   Café <dbl>, Cebola <dbl>, `Complexo soja` <dbl>, `Complexo
## #   sucroalc.` <dbl>, Feijão <dbl>, Frutas <dbl>, Hortícolas <dbl>,
## #   Indefinido <dbl>, `Laranja e citros` <dbl>, Lácteos <dbl>, Mandioca <dbl>,
## #   Milho <dbl>, Pescado <dbl>, Suinocultura <dbl>, Tomate <dbl>, Trigo <dbl>
```

```
zt0 <- ts(data[,2], frequency = 12, start = 2007, end = 2019)
zt1 <- ts(data[,3], frequency = 12, start = 2007, end = 2019)
zt2 <- ts(data[,4], frequency = 12, start = 2007, end = 2019)
zt3 <- ts(data[,5], frequency = 12, start = 2007, end = 2019)
zt4 <- ts(data[,6], frequency = 12, start = 2007, end = 2019)
zt5 <- ts(data[,7], frequency = 12, start = 2007, end = 2019)
zt6 <- ts(data[,8], frequency = 12, start = 2007, end = 2019)
zt7 <- ts(data[,9], frequency = 12, start = 2007, end = 2019)
zt8 <- ts(data[,10], frequency = 12, start = 2007, end = 2019)
zt9 <- ts(data[,11], frequency = 12, start = 2007, end = 2019)

zt10 <- ts(data[,12], frequency = 12, start = 2007, end = 2019)
zt11 <- ts(data[,13], frequency = 12, start = 2007, end = 2019)
zt12 <- ts(data[,14], frequency = 12, start = 2007, end = 2019)
zt13 <- ts(data[,15], frequency = 12, start = 2007, end = 2019)
zt14 <- ts(data[,16], frequency = 12, start = 2007, end = 2019)
zt15 <- ts(data[,17], frequency = 12, start = 2007, end = 2019)
zt16 <- ts(data[,18], frequency = 12, start = 2007, end = 2019)
zt17 <- ts(data[,19], frequency = 12, start = 2007, end = 2019)
zt18 <- ts(data[,20], frequency = 12, start = 2007, end = 2019)
zt19 <- ts(data[,21], frequency = 12, start = 2007, end = 2019)
zt20 <- ts(data[,22], frequency = 12, start = 2007, end = 2019)
zt21 <- ts(data[,23], frequency = 12, start = 2007, end = 2019)
zt22 <- ts(data[,24], frequency = 12, start = 2007, end = 2019)
```

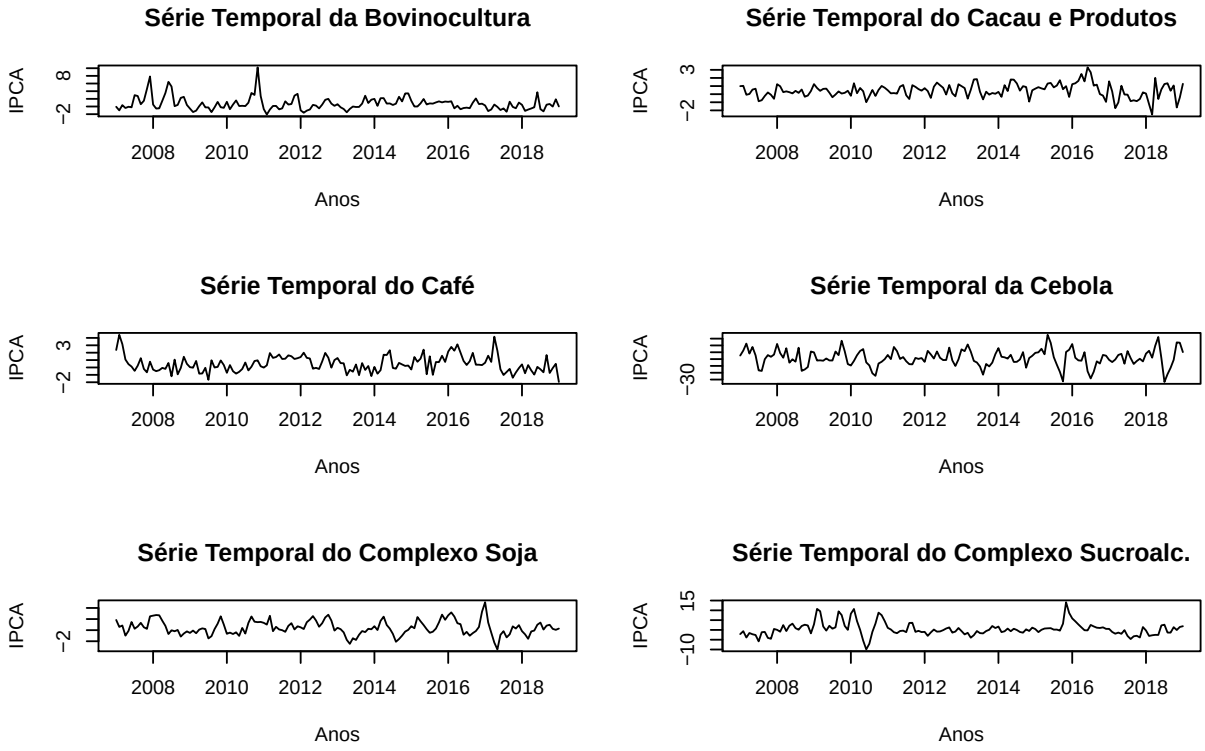
```r
plot(zt0,main="Série Temporal do Arroz", xlab= "Anos", ylab="IPCA")
```



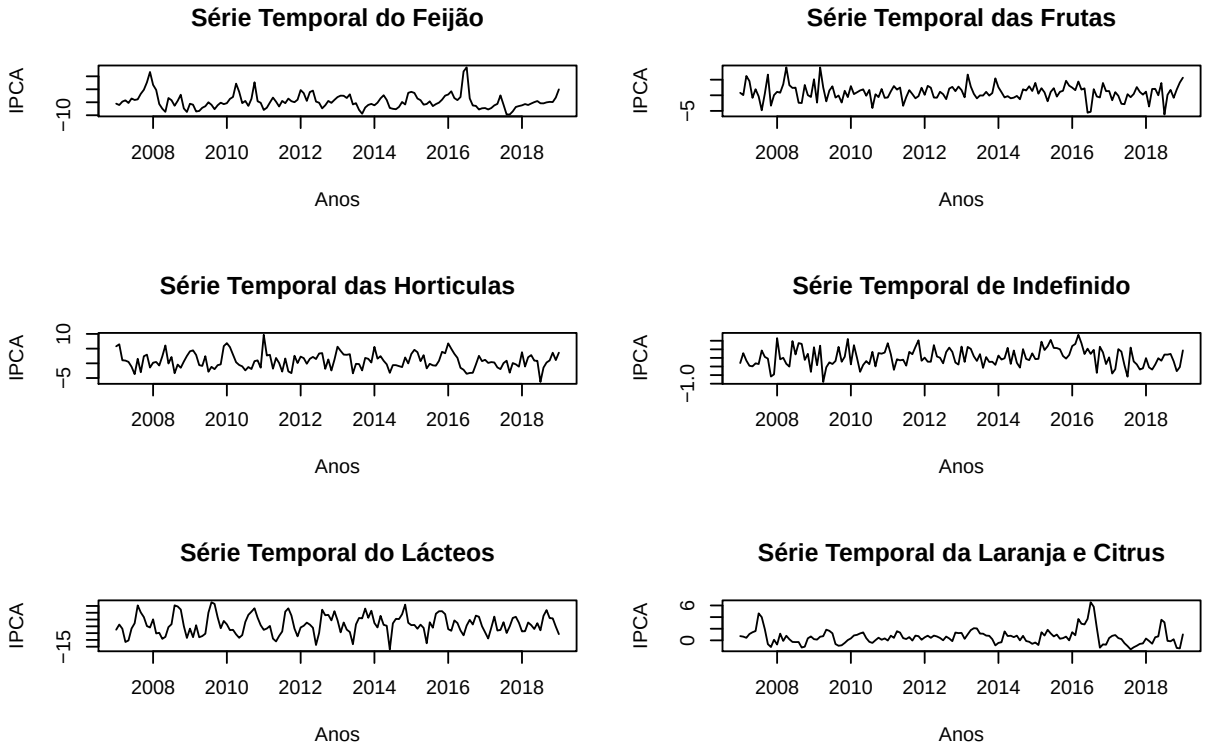

```r
par(mfrow = c(2, 2))
plot(zt1,main="Série Temporal de Avicultura de Corte", xlab= "Anos", ylab="IPCA")
plot(zt2,main="Série Temporal de Avicultura de Postura", xlab= "Anos", ylab="IPCA")
plot(zt3,main="Série Temporal da Banana", xlab= "Anos", ylab="IPCA")
plot(zt4,main="Série Temporal da Batata", xlab= "Anos", ylab="IPCA")
```



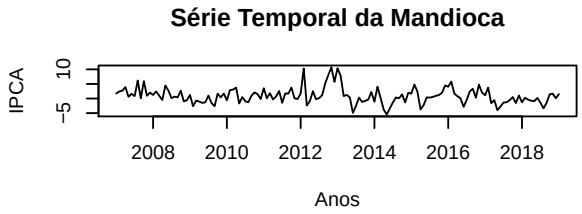

```
par(mfrow = c(3, 2))


plot(zt5,main="Série Temporal da Bovinocultura", xlab= "Anos", ylab="IPCA")
plot(zt6,main="Série Temporal do Cacau e Produtos", xlab= "Anos", ylab="IPCA")
plot(zt7,main="Série Temporal do Café", xlab= "Anos", ylab="IPCA")
plot(zt8,main="Série Temporal da Cebola", xlab= "Anos", ylab="IPCA")
plot(zt9,main="Série Temporal do Complexo Soja", xlab= "Anos", ylab="IPCA")
plot(zt10,main="Série Temporal do Complexo Sucroalc.", xlab= "Anos", ylab="IPCA")
```

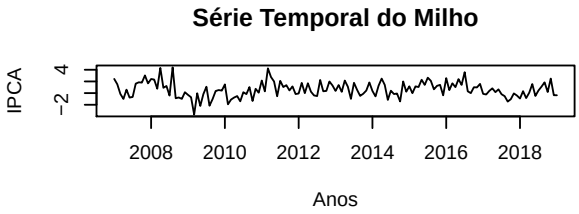


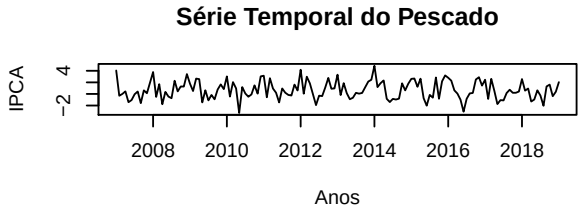

```
par(mfrow = c(3, 2))


plot(zt11,main="Série Temporal do Feijão", xlab= "Anos", ylab="IPCA")
plot(zt12,main="Série Temporal das Frutas", xlab= "Anos", ylab="IPCA")
plot(zt13,main="Série Temporal das Horticulas", xlab= "Anos", ylab="IPCA")
plot(zt14,main="Série Temporal de Indefinido", xlab= "Anos", ylab="IPCA")
plot(zt15,main="Série Temporal do Lácteos", xlab= "Anos", ylab="IPCA")
plot(zt16,main="Série Temporal da Laranja e Citrus", xlab= "Anos", ylab="IPCA")
```

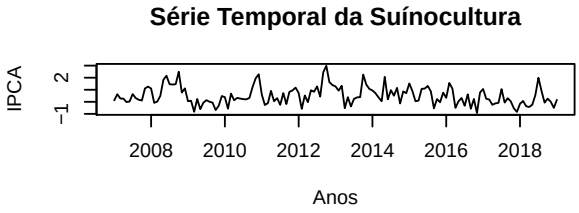


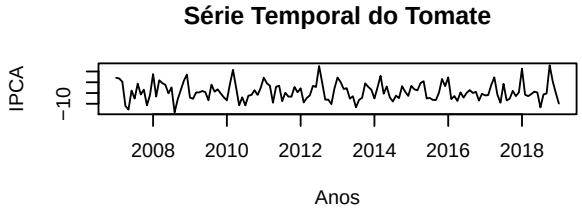

```r
par(mfrow = c(3, 2))


plot(zt17,main="Série Temporal da Mandioca", xlab= "Anos", ylab="IPCA")
plot(zt18,main="Série Temporal do Milho", xlab= "Anos", ylab="IPCA")
plot(zt19,main="Série Temporal do Pescado", xlab= "Anos", ylab="IPCA")
plot(zt20,main="Série Temporal da Suínocultura", xlab= "Anos", ylab="IPCA")
plot(zt21,main="Série Temporal do Tomate", xlab= "Anos", ylab="IPCA")
plot(zt22,main="Série Temporal do Trigo", xlab= "Anos", ylab="IPCA")
```

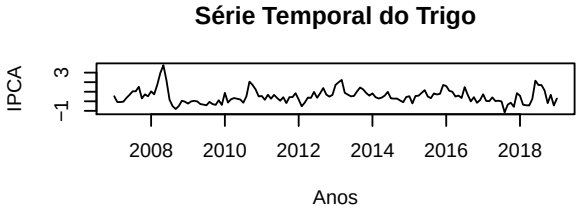




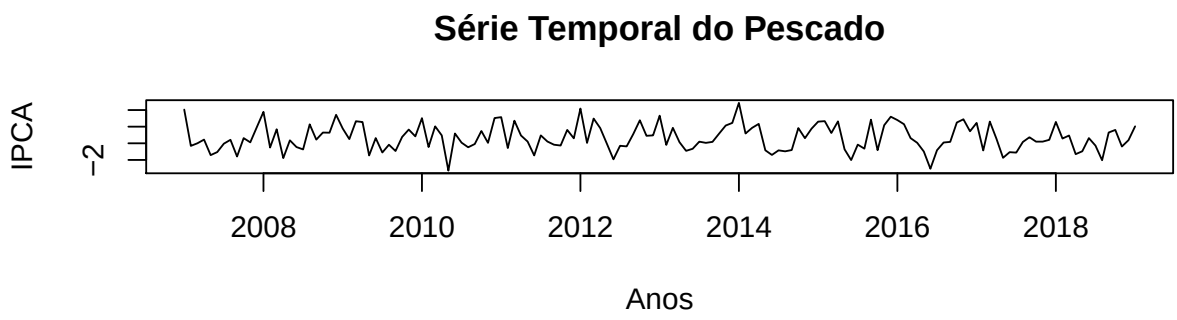


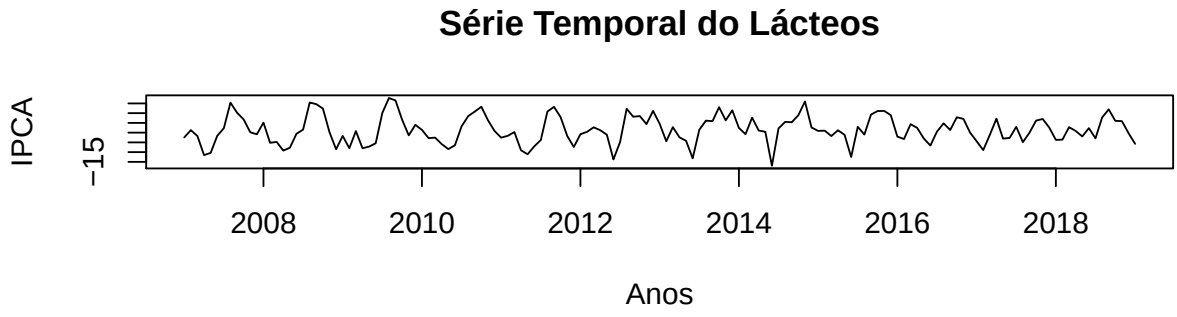






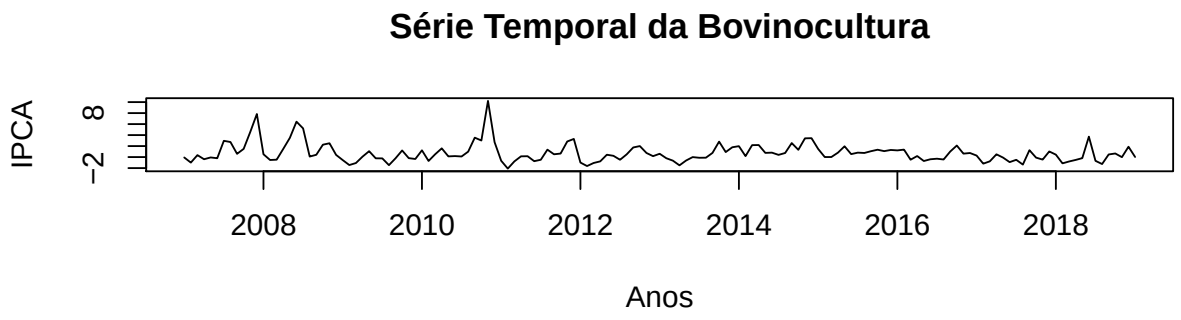

```r
par(mfrow = c(2, 1))
plot(zt19,main="Série Temporal do Pescado", xlab= "Anos", ylab="IPCA")
plot(zt15,main="Série Temporal do Lácteos", xlab= "Anos", ylab="IPCA")
```

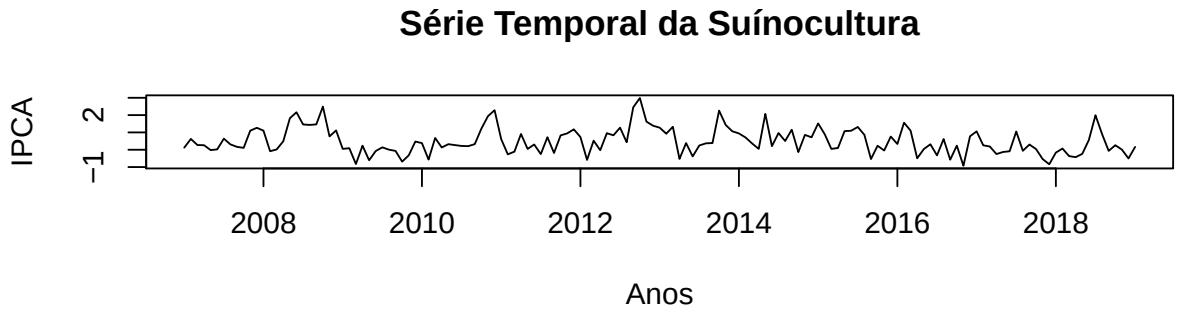




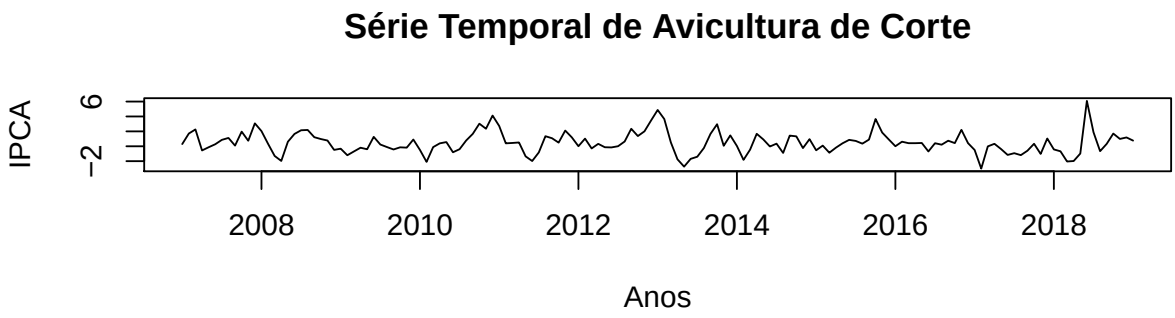

```
#900#650
```

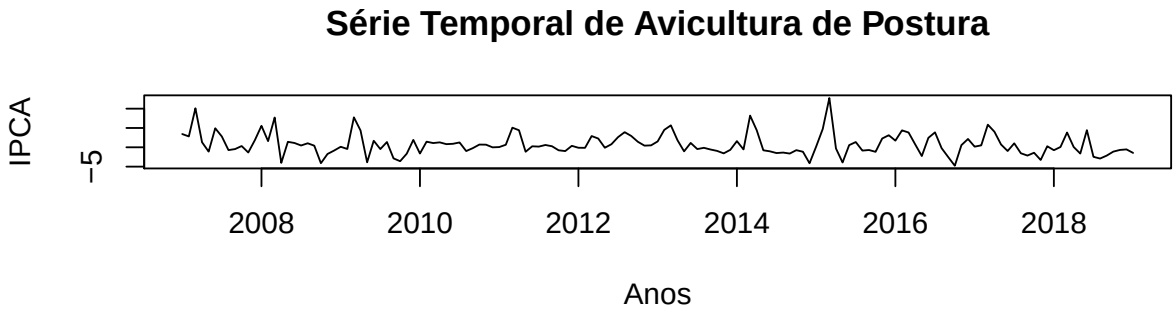
```
par(mfrow = c(2, 1))
plot(zt5,main="Série Temporal da Bovinocultura", xlab= "Anos", ylab="IPCA")
plot(zt20,main="Série Temporal da Suínocultura", xlab= "Anos", ylab="IPCA")
```





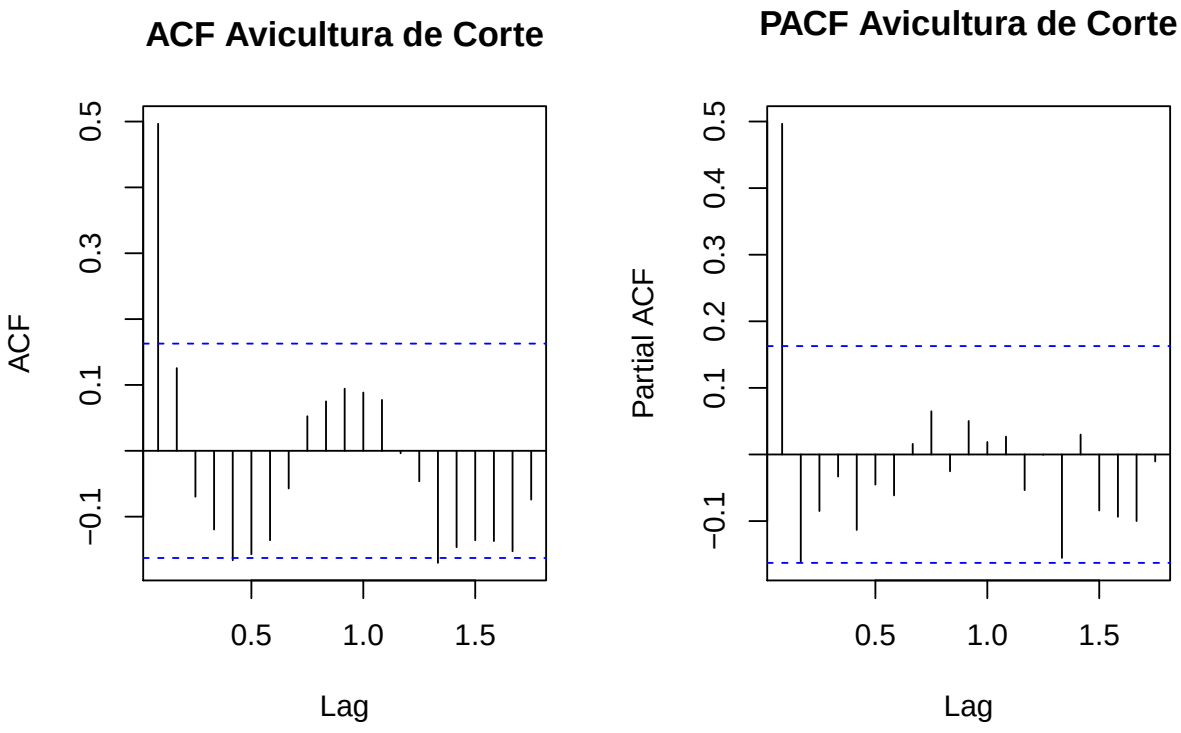

```
par(mfrow = c(2, 1))
plot(zt1,main="Série Temporal de Avicultura de Corte", xlab= "Anos", ylab="IPCA")
plot(zt2,main="Série Temporal de Avicultura de Postura", xlab= "Anos", ylab="IPCA")
```



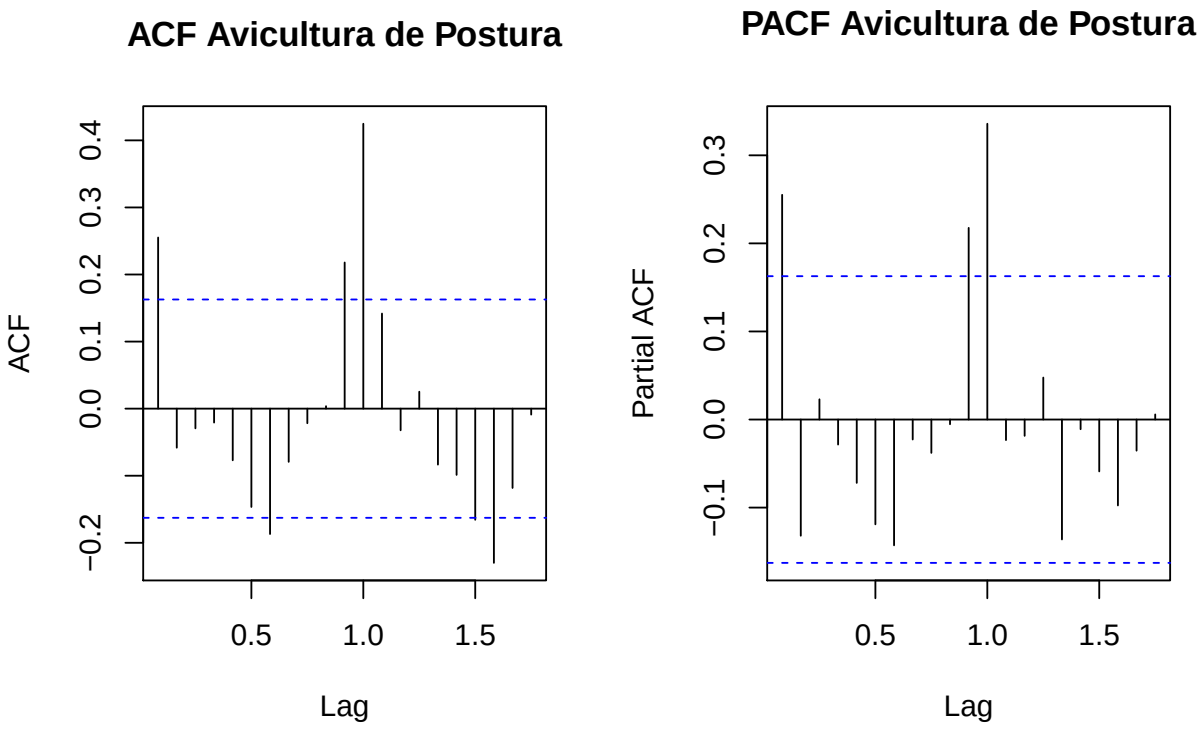


Funções de Autocorrelações

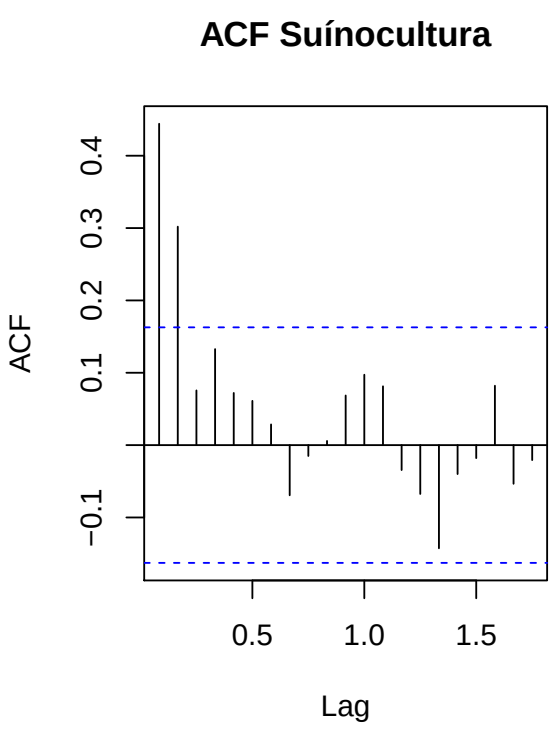
```
par(mfrow = c(1, 2))
acf(zt1, main="ACF Avicultura de Corte")
pacf(zt1, main="PACF Avicultura de Corte")
```

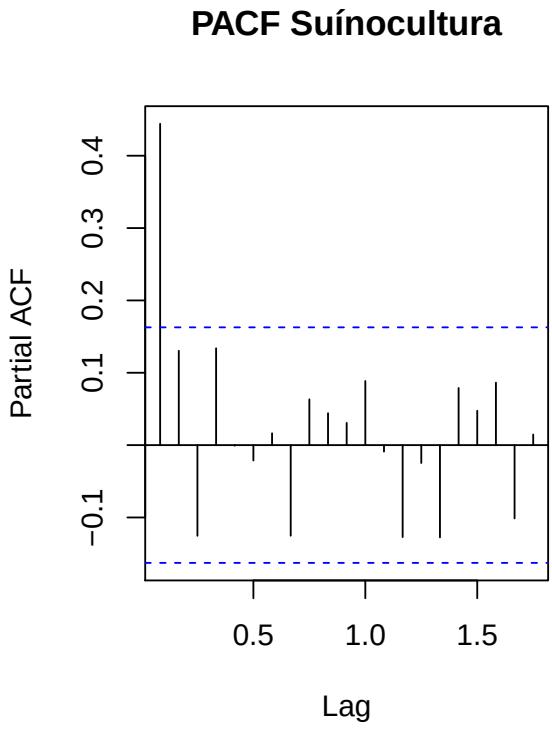



```
par(mfrow = c(1, 2))
acf(zt2, main="ACF Avicultura de Postura")
pacf(zt2, main="PACF Avicultura de Postura")
```

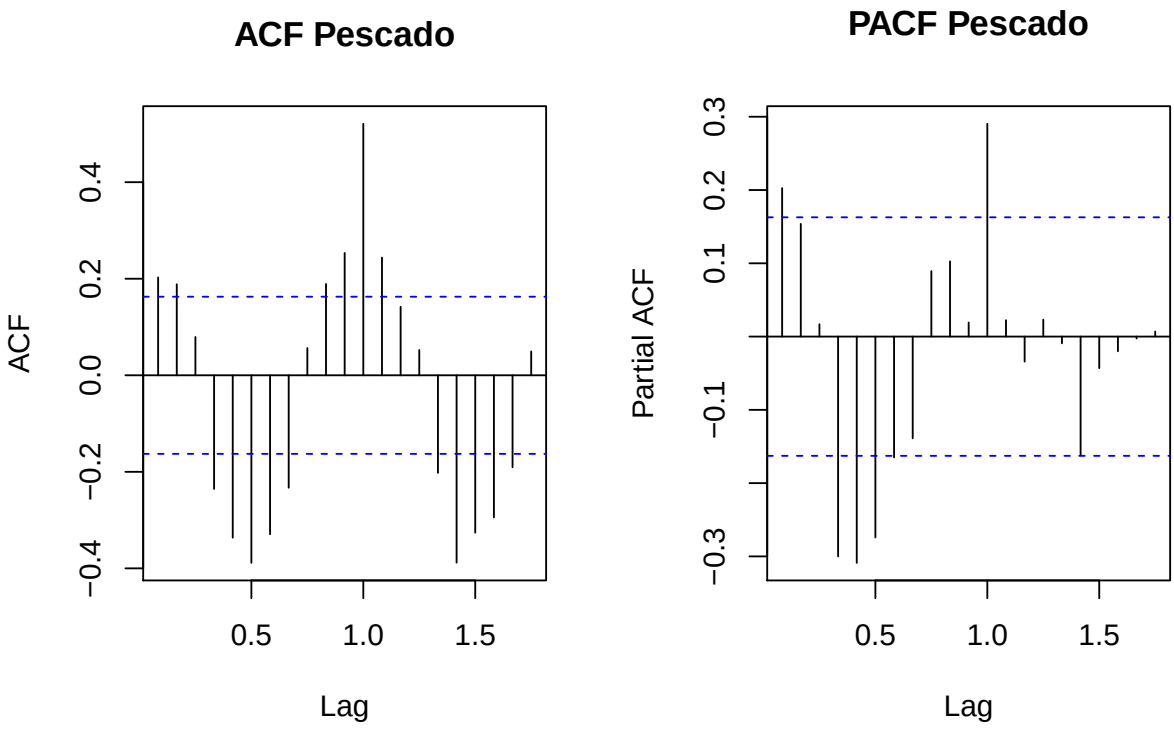



```
par(mfrow = c(1, 2))
acf(zt20, main="ACF Suínocultura")
pacf(zt20, main="PACF Suínocultura")
```

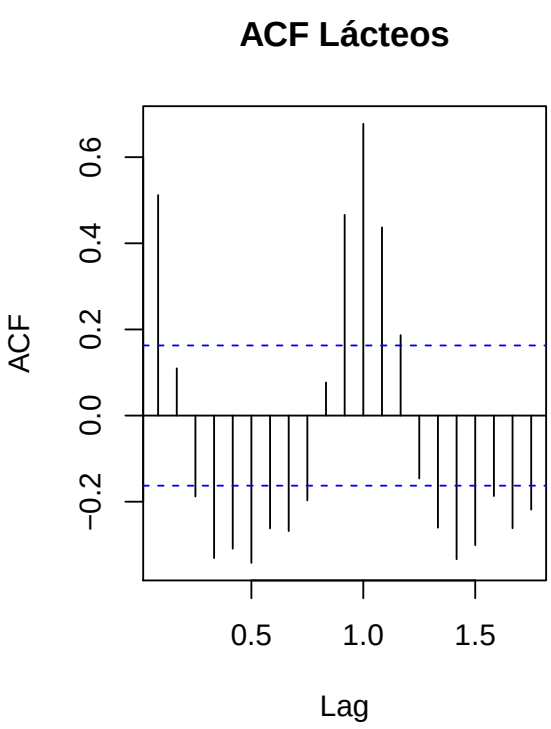


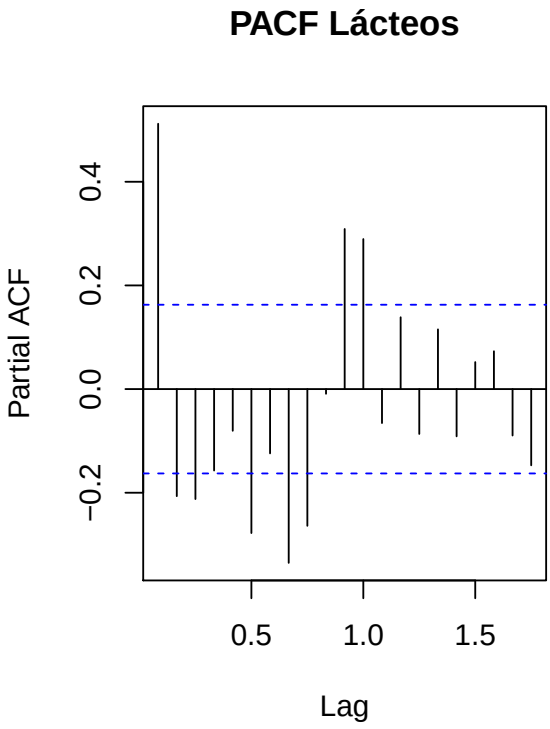



```
par(mfrow = c(1, 2))
acf(zt19, main="ACF Pescado")
pacf(zt19, main="PACF Pescado")
```

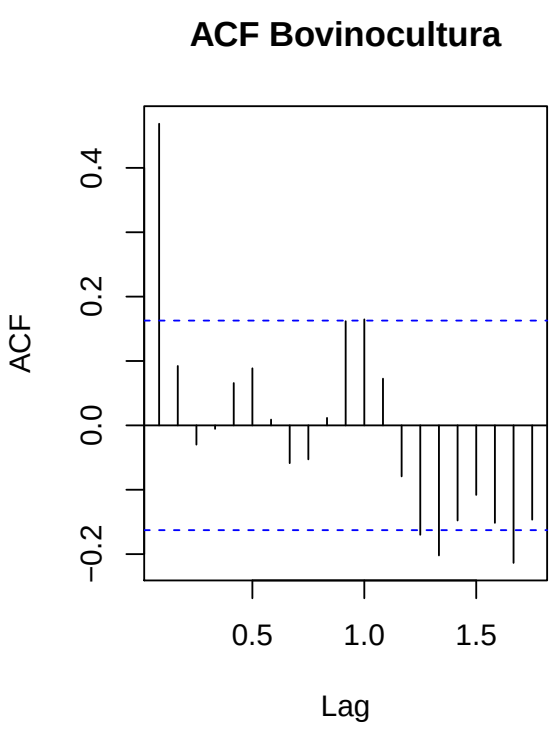


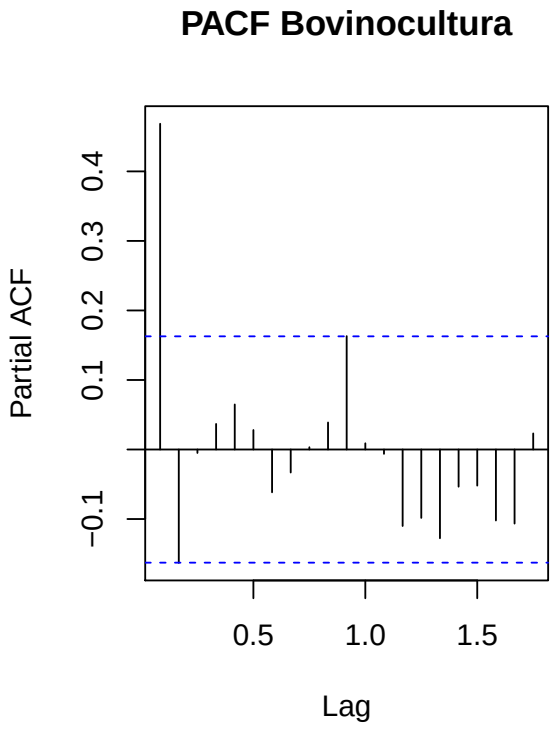

```
par(mfrow = c(1, 2))
acf(zt15, main="ACF Lácteos")
pacf(zt15, main="PACF Lácteos")
```





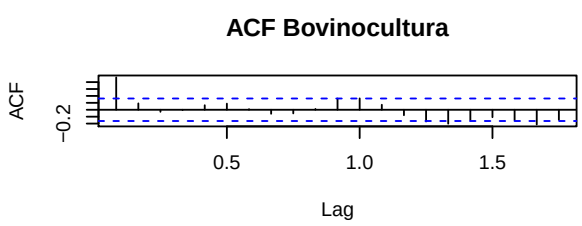

```
par(mfrow = c(1, 2))
acf(zt5, main="ACF Bovinocultura")
pacf(zt5, main="PACF Bovinocultura")
```

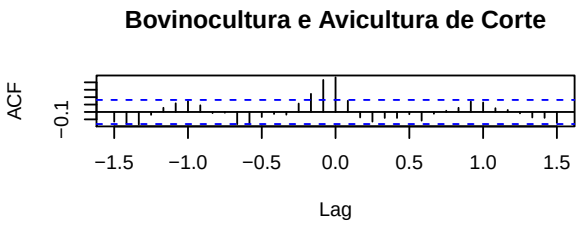


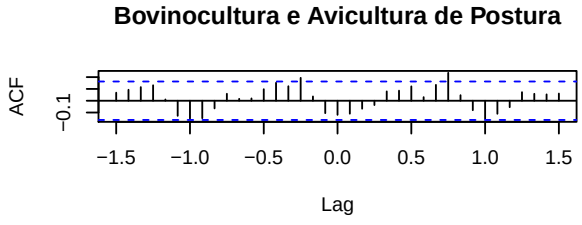


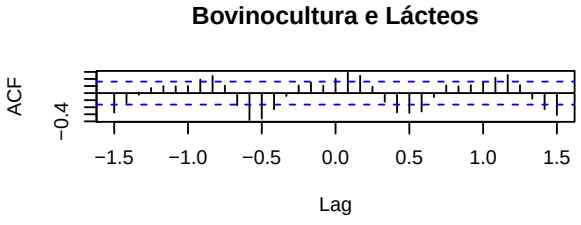
Análise Correlação Cruzada

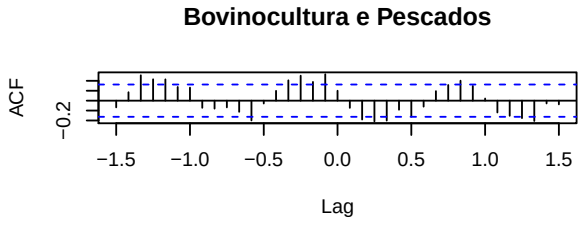
```
#Correlaões cruzadas da Bovincultura
par(mfrow = c(3,2))
acf(zt5,main="ACF Bovinocultura")
ccf(zt5,zt1,main="Bovinocultura e Avicultura de Corte")
ccf(zt5,zt2,main="Bovinocultura e Avicultura de Postura")
ccf(zt5,zt15,main="Bovinocultura e Lácteos")
ccf(zt5,zt19,main="Bovinocultura e Pescados")
ccf(zt0,zt20,main="Bovinocultura e Suinocultura")
```

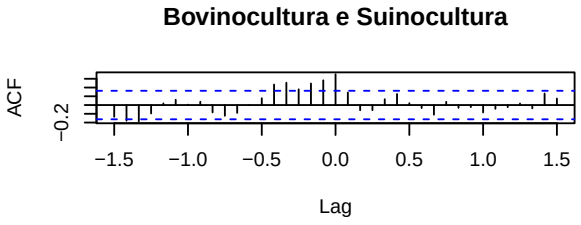




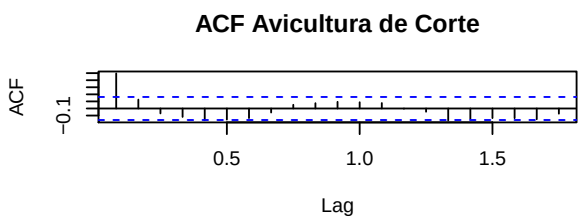


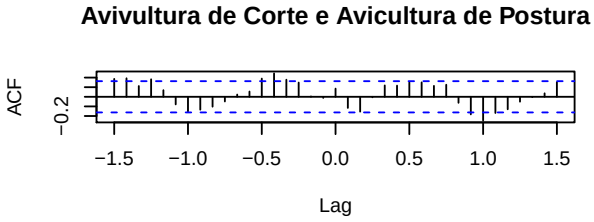


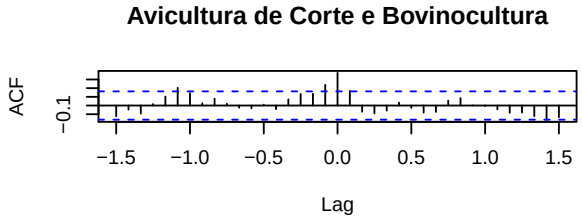


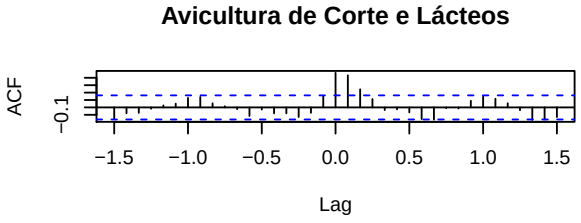


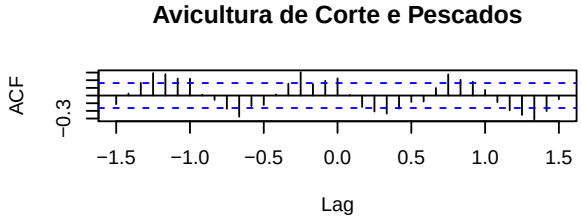

```r
#Correlações cruzadas da Avicultura de Corte
par(mfrow = c(3,2))
acf(zt1,main="ACF Avicultura de Corte")
ccf(zt1,zt2,main="Avivultura de Corte e Avicultura de Postura")
ccf(zt1,zt3,main="Avicultura de Corte e Bovinocultura")
ccf(zt1,zt5,main="Avicultura de Corte e Lácteos")
ccf(zt1,zt19,main="Avicultura de Corte e Pescados")
ccf(zt1,zt20,main="Avicultura de Corte e Suinocultura")
```

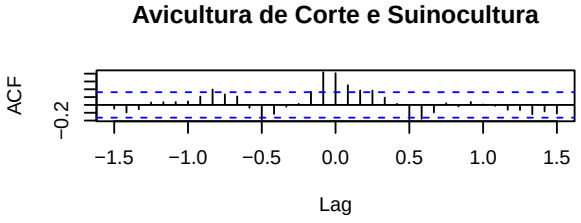




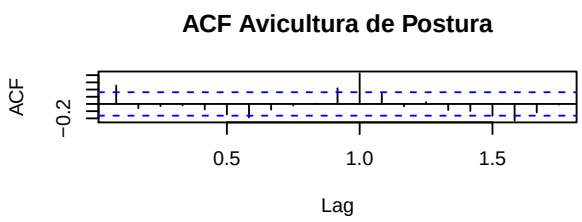


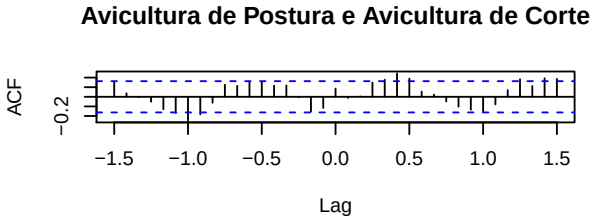


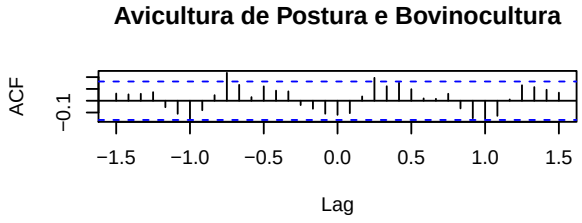


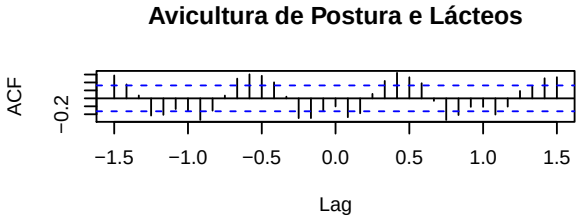


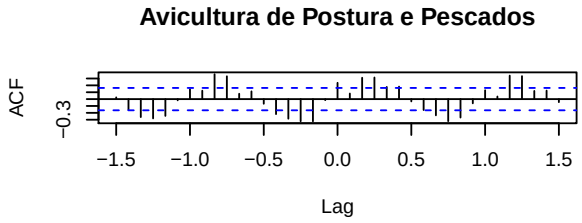

```r
#Correlações cruzadas da Avicultura de Postura
par(mfrow = c(3,2))
acf(zt2,main="ACF Avicultura de Postura")
ccf(zt2,zt1,main="Avicultura de Postura e Avicultura de Corte")
ccf(zt2,zt5,main="Avicultura de Postura e Bovinocultura")
ccf(zt2,zt15,main="Avicultura de Postura e Lácteos")
ccf(zt2,zt19,main="Avicultura de Postura e Pescados")
ccf(zt2,zt20,main="Avicultura de Postura e Suinocultura")
```

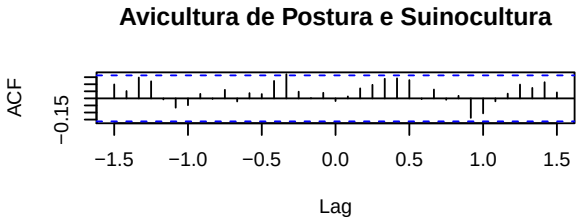




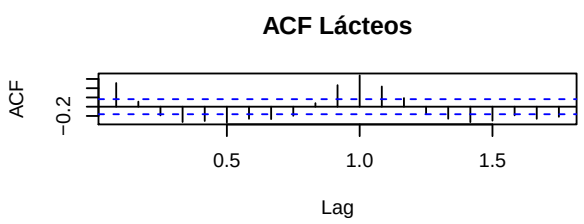


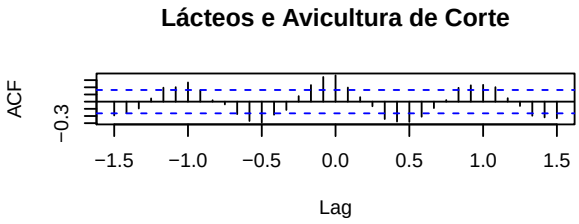


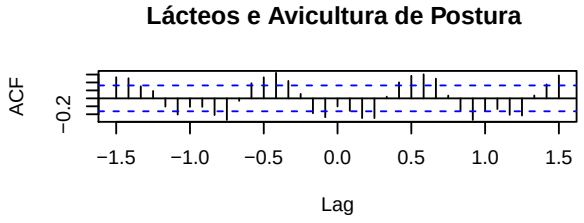


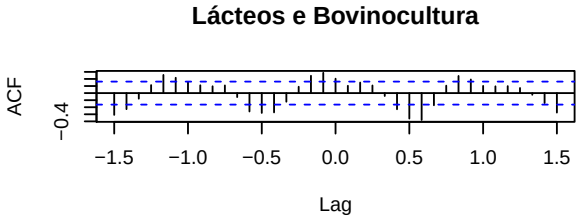


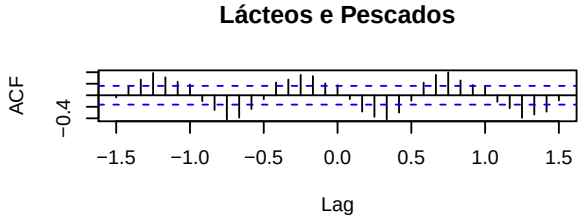

```r
#Correlações cruzadas dos Lácteos
par(mfrow = c(3,2))
acf(zt15,main="ACF Lácteos")
ccf(zt15,zt1,main="Lácteos e Avicultura de Corte")
ccf(zt15,zt2,main="Lácteos e Avicultura de Postura ")
ccf(zt15,zt5,main="Lácteos e Bovinocultura")
ccf(zt15,zt19,main="Lácteos e Pescados")
ccf(zt15,zt20,main="Lácteos e Suinocultura")
```

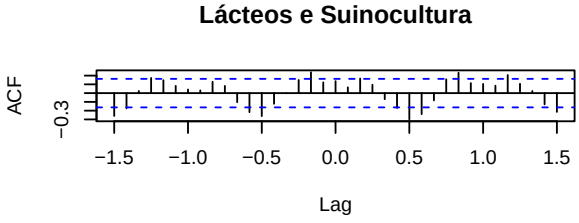




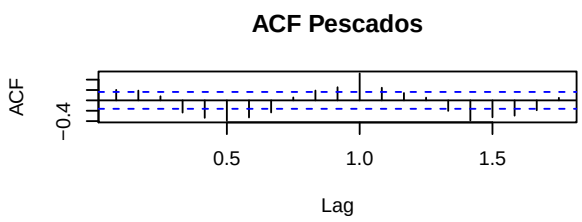


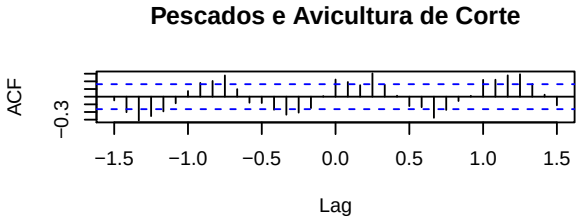


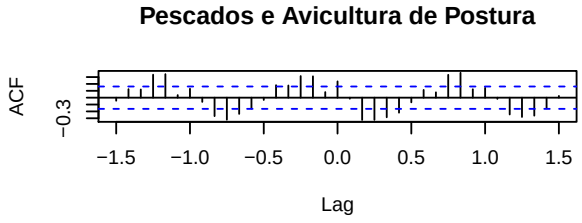


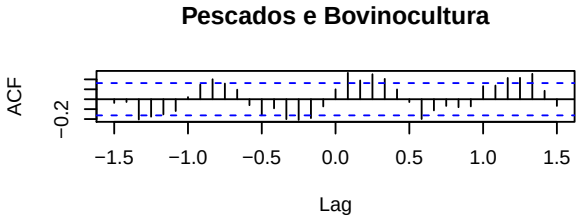


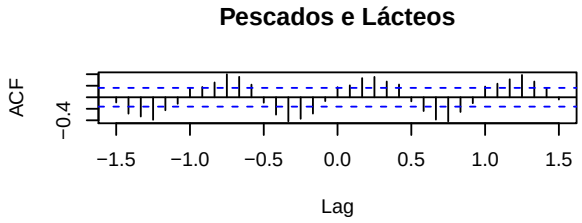

```r
# Correlaões cruzadas dos Pescados
par(mfrow = c(3,2))
acf(zt19,main="ACF Pescados")
ccf(zt19,zt1,main="Pescados e Avicultura de Corte")
ccf(zt19,zt2,main="Pescados e Avicultura de Postura")
ccf(zt19,zt5,main="Pescados e Bovinocultura")
ccf(zt19,zt15,main="Pescados e Lácteos")
ccf(zt19,zt20,main="Pescados e Suinocultura")
```

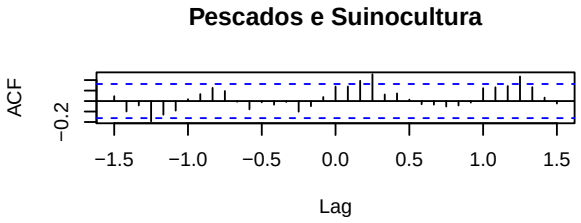




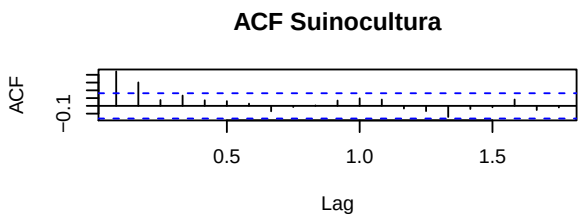


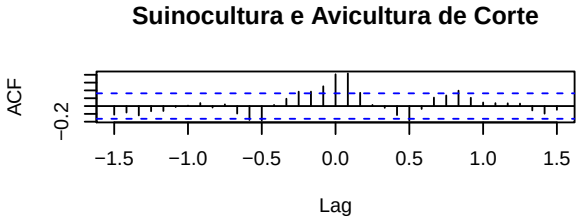


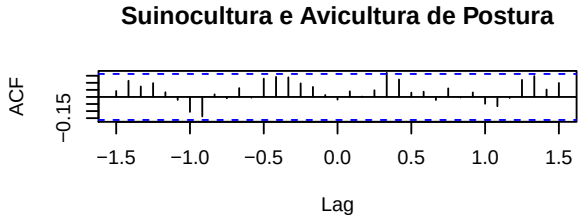


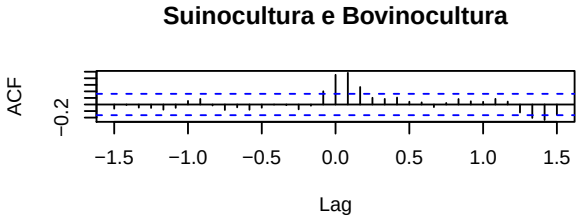


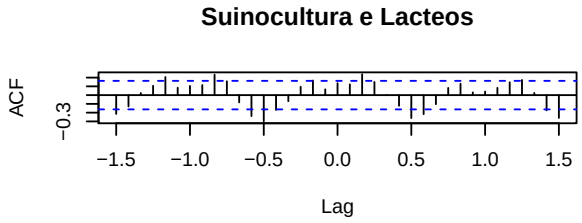

```r
#Correlações cruzadas da Suinocultura
par(mfrow = c(3,2))
acf(zt20,main="ACF Suinocultura")
ccf(zt20,zt1,main="Suinocultura e Avicultura de Corte")
ccf(zt20,zt2,main="Suinocultura e Avicultura de Postura")
ccf(zt20,zt5,main="Suinocultura e Bovinocultura")
ccf(zt20,zt15,main="Suinocultura e Lacteos")
ccf(zt20,zt19,main="Suinocultura e Pescados")
```

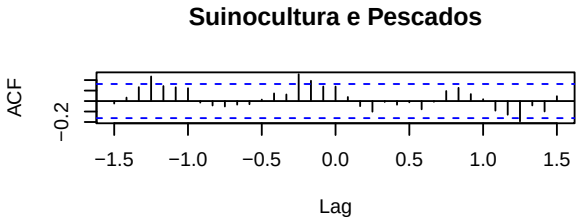












Regressão LASSO

```
library(glmnet)
```

```
## Loading required package: Matrix
```

```
##
## Attaching package: 'Matrix'
```

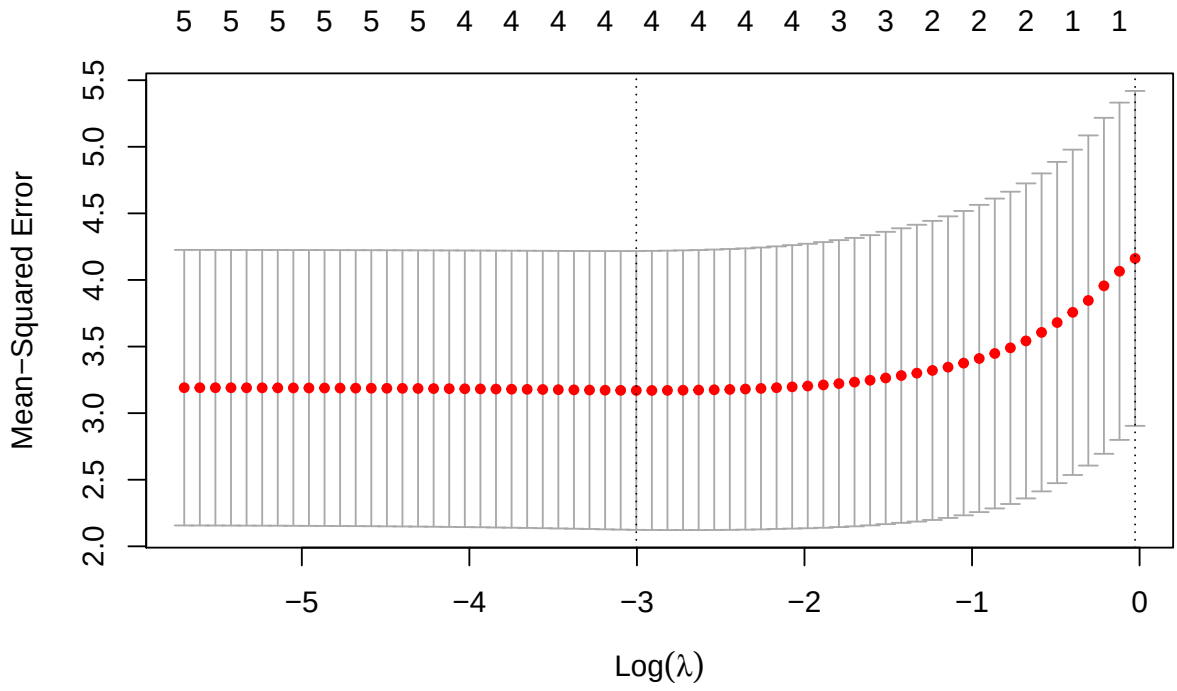
```
## The following objects are masked from 'package:tidyr':
##
##     expand, pack, unpack
```

```
## Loaded glmnet 4.0-2
```

```
set.seed(123)
x <-subset(data, select = c("Lácteos", "Pescado", "Suinocultura", "Avicultura de Postura", "Avicultura d

x = model.matrix(Bovinocultura~.,x)[,-1]
y = data$Bovinocultura

cv.lasso <- cv.glmnet(x, y, alpha = 1, family = "gaussian")
print(cv.lasso)
```

```
##
## Call:  cv.glmnet(x = x, y = y, alpha = 1, family = "gaussian")
##
## Measure: Mean-Squared Error
##
##     Lambda Measure    SE Nonzero
## min 0.0496   3.170 1.047       4
## 1se 0.9736   4.162 1.257       0
```

```
plot(cv.lasso)
```




```
cv.lasso$lambda.min
```

```
## [1] 0.04959573
```

```
cv.lasso$lambda.1se
```

```
## [1] 0.9735844
```

```
coef(cv.lasso, cv.lasso$lambda.min)
```

```
## 6 x 1 sparse Matrix of class "dgCMatrix"
##                                      1
```

```
## (Intercept)              0.38838316
## Lácteos                 -0.13890259
## Pescado                  .
## Suinocultura             0.54568069
## `Avicultura de Postura` -0.02703794
## `Avicultura de Corte`    0.54637270
```

```
coef(cv.lasso, cv.lasso$lambda.1se)
```

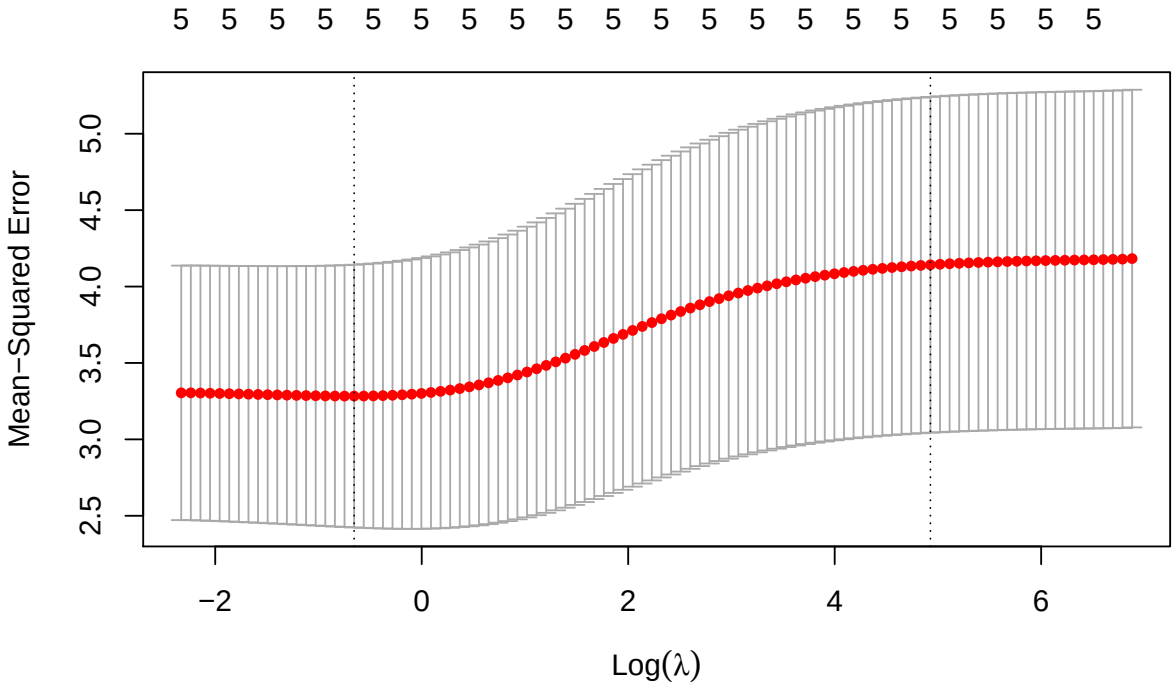
```
## 6 x 1 sparse Matrix of class "dgCMatrix"
##                                  1
## (Intercept)             0.8359205
## Lácteos                 .
## Pescado                 .
## Suinocultura            .
## `Avicultura de Postura` .
## `Avicultura de Corte`   .
```

Regressão RIDGE

```
set.seed(1234)

cv.ridge <- cv.glmnet(x, y, alpha = 0, family = "gaussian")
print(cv.ridge)
```

```
##
## Call:  cv.glmnet(x = x, y = y, alpha = 0, family = "gaussian")
##
## Measure: Mean-Squared Error
##
##     Lambda Measure     SE Nonzero
## min   0.52   3.283 0.8596       5
## 1se 138.00   4.142 1.0986       5
```

```
plot(cv.ridge)
```




```
cv.ridge$lambda.min
```

```
## [1] 0.5195727
```

```
cv.ridge$lambda.1se
```

```
## [1] 138.0031
```

```
coef(cv.ridge, cv.ridge$lambda.min)
```

```
## 6 x 1 sparse Matrix of class "dgCMatrix"
##                                      1
## (Intercept)                 0.43304557
## Lácteos                    -0.13761999
## Pescado                     0.01016975
## Suinocultura                0.53670342
## 'Avicultura de Postura'    -0.03336956
## 'Avicultura de Corte'       0.46376848
```

```
coef(cv.ridge, cv.ridge$lambda.1se)
```

```
## 6 x 1 sparse Matrix of class "dgCMatrix"
##                                      1
```

```
## (Intercept)              0.8240269302
## Lácteos                 -0.0028257285
## Pescado                  0.0021513634
## Suinocultura             0.0151030133
## `Avicultura de Postura` -0.0003758451
## `Avicultura de Corte`    0.0099009249
```