

Simulação de dados incompletos/limitados como indícios de subestimação dos parâmetros nos modelos não lineares de crescimento.

PROGRAMA DE PÓS GRADUAÇÃO EM ESTATÍSTICA E
EXPERIMENTAÇÃO AGROPECUÁRIA

Doutorando: Carlos Antônio Zarzar

Orientadora: Izabela R. C. de Oliveira

Data: 15/12/2020

AGRADECIMENTO E COLABORADORES:

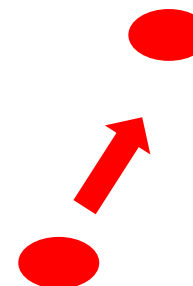


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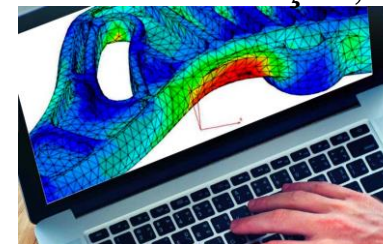


Sumário:

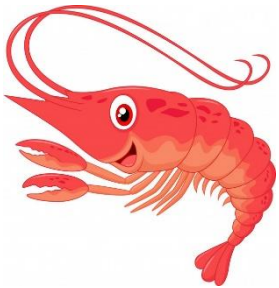
1. Contextualização;
 - Objeto de estudo;
 - Fenômeno de estudo;
2. Problema Motivacional;
3. Delineamento Experimental;
 - Observacional;
 - Experimental;
4. Simulação;
5. Práticas no R *Software*.

5. Práticas no R *Software*.

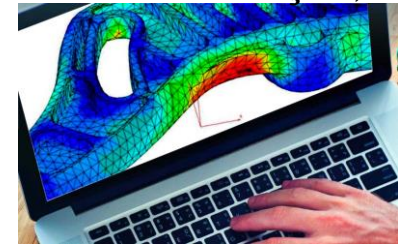
4. Simulação;



1. Contextualização

5. Práticas no R *Software*.

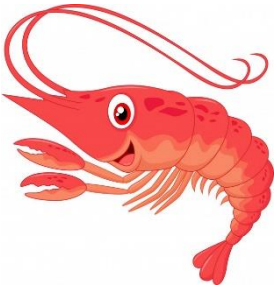
4. Simulação;



2. Problema Motivacional



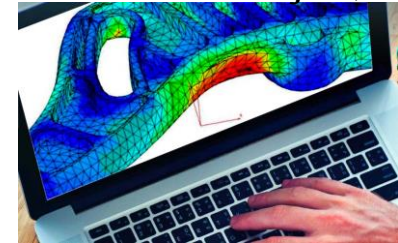
1. Contextualização



5. Práticas no R Software.



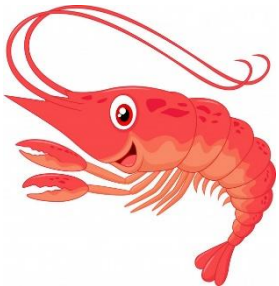
4. Simulação;



2. Problema Motivacional



1. Contextualização



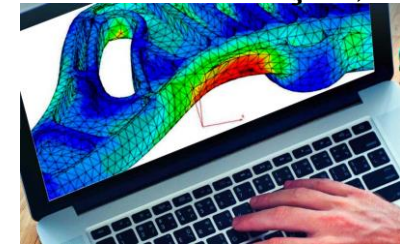
3. Delineamento Experimental



5. Práticas no R Software.



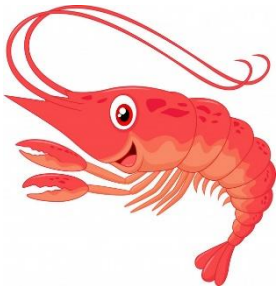
4. Simulação;



2. Problema Motivacional



1. Contextualização



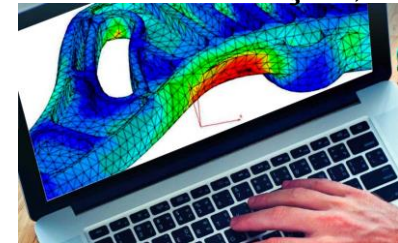
3. Delineamento Experimental



5. Práticas no R Software.



4. Simulação;



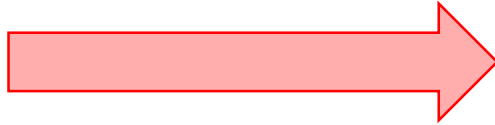


Litopenaeus vannamei

Camarão alho e óleo



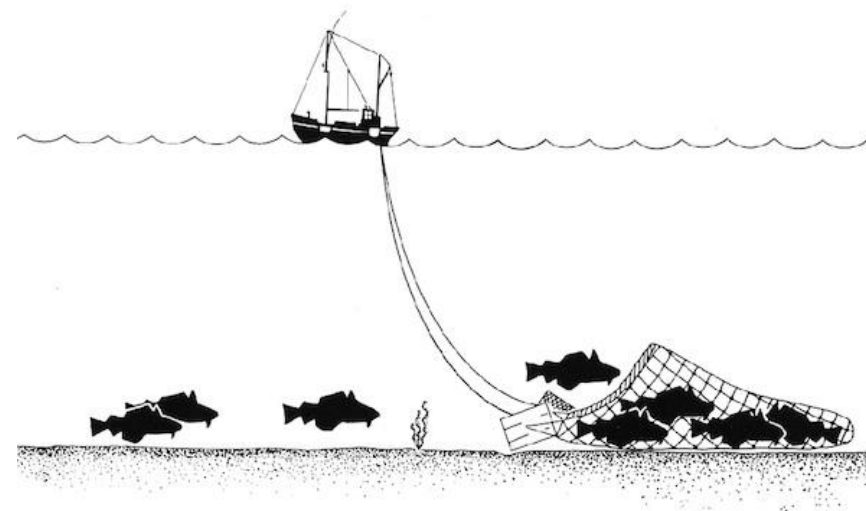
Litopenaeus vannamei



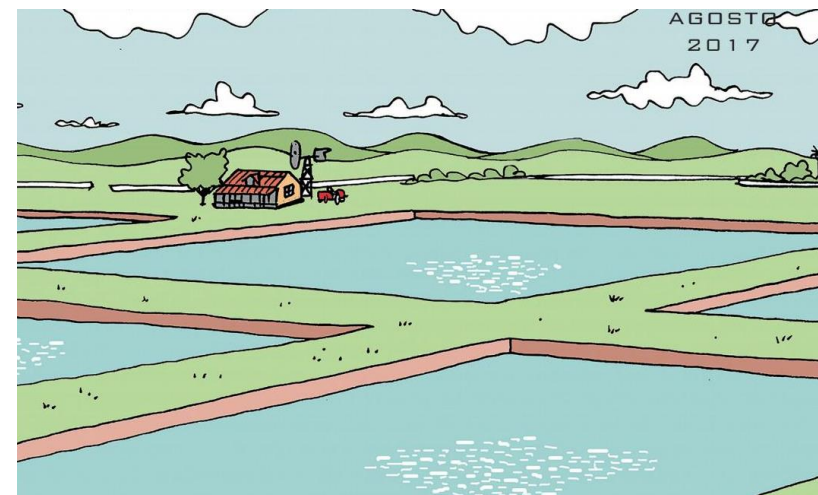
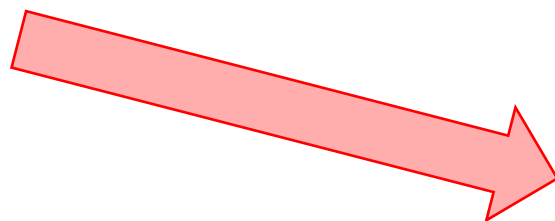


Litopenaeus vannamei

Pesca



Aquicultura





Litopenaeus vannamei

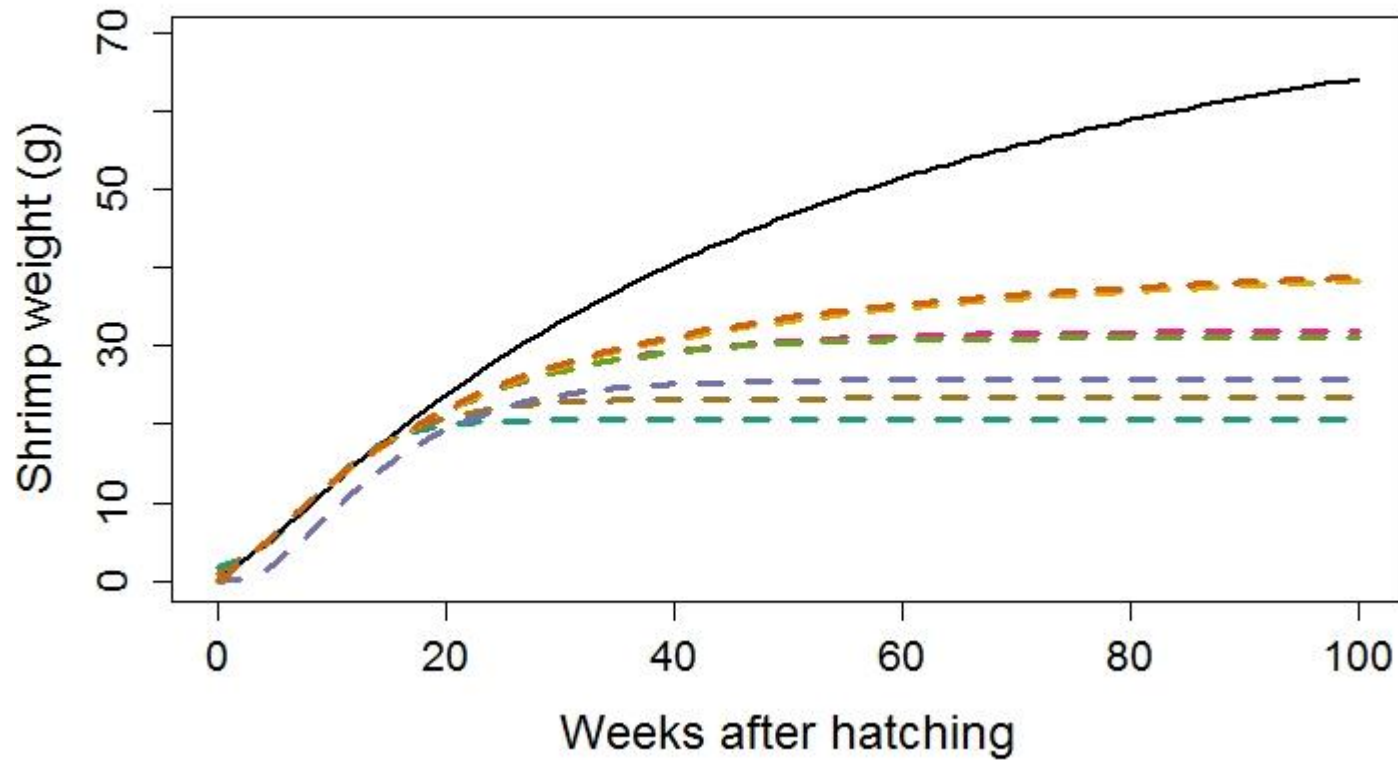


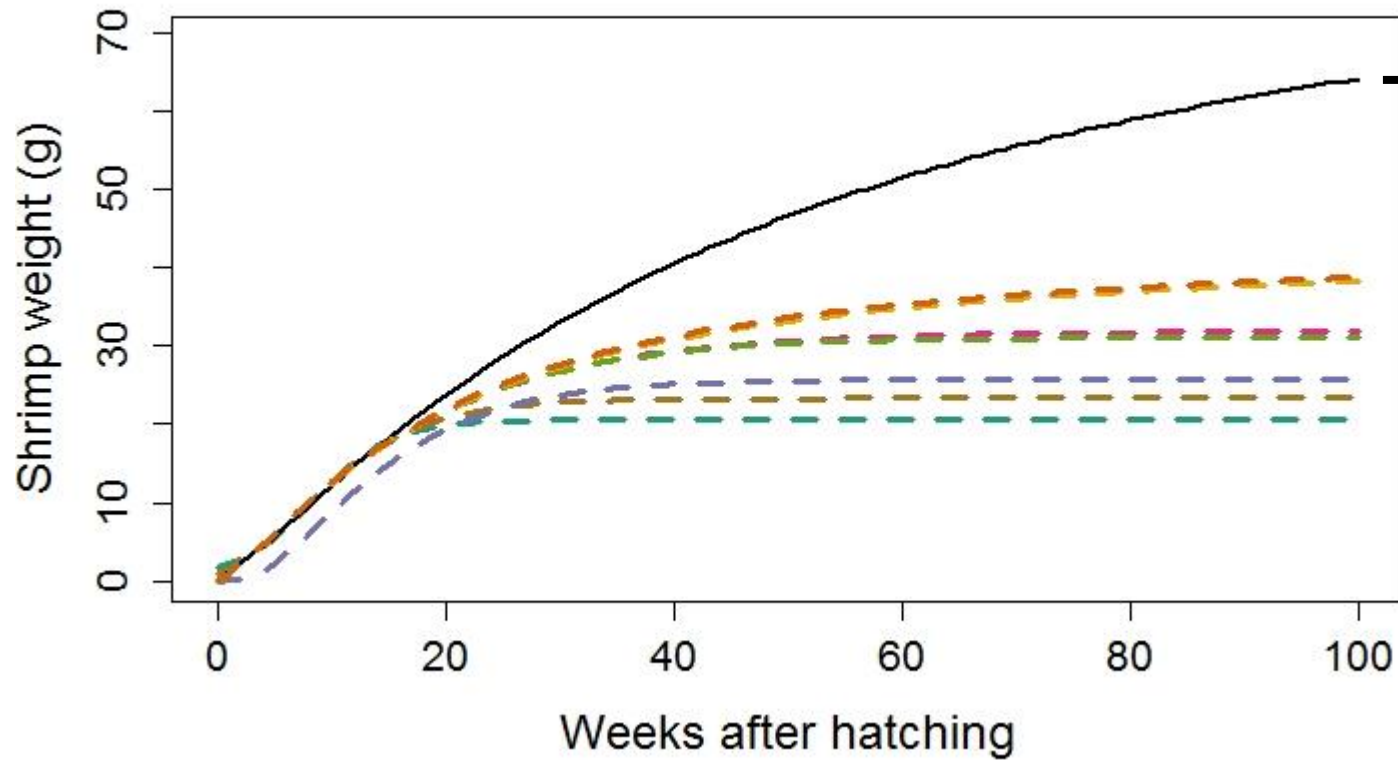
Carcinicultura



Litopenaeus vannamei

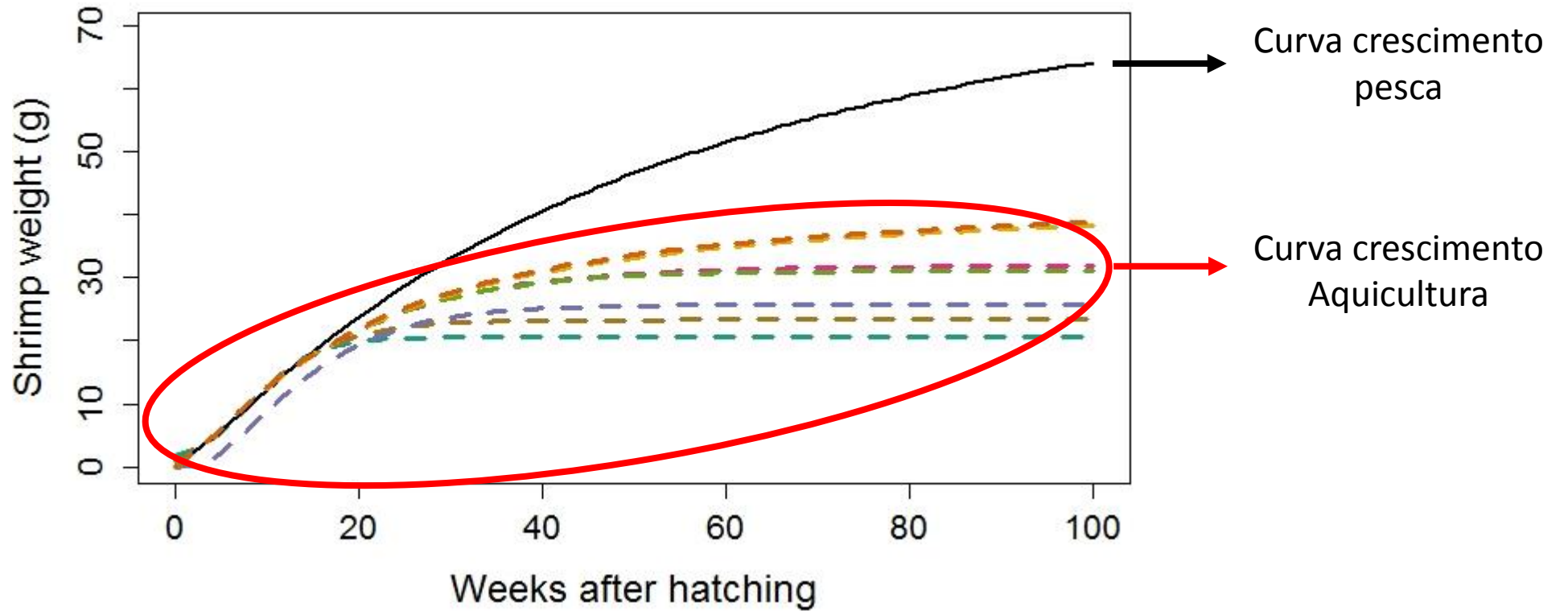


Curva de crescimento do Camarão (*Litopenaeus vannamei*)*Litopenaeus vannamei*

Curva de crescimento do Camarão (*Litopenaeus vannamei*)

Curva crescimento
pesca

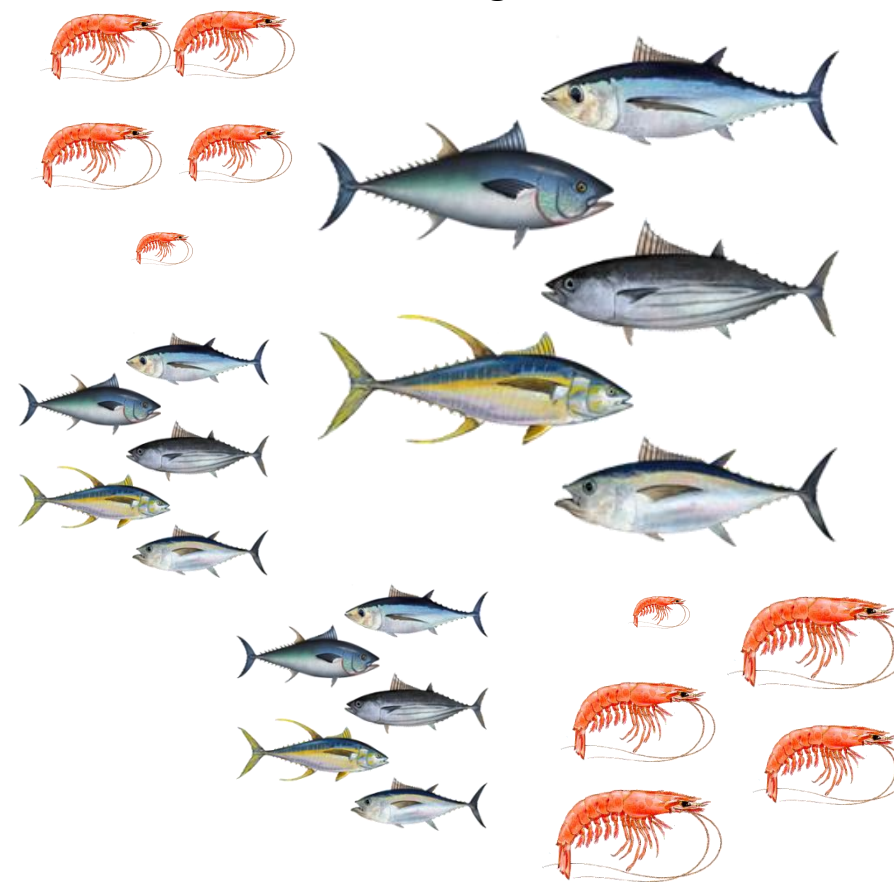
*Litopenaeus vannamei*

Curva de crescimento do Camarão (*Litopenaeus vannamei*)*Litopenaeus vannamei*

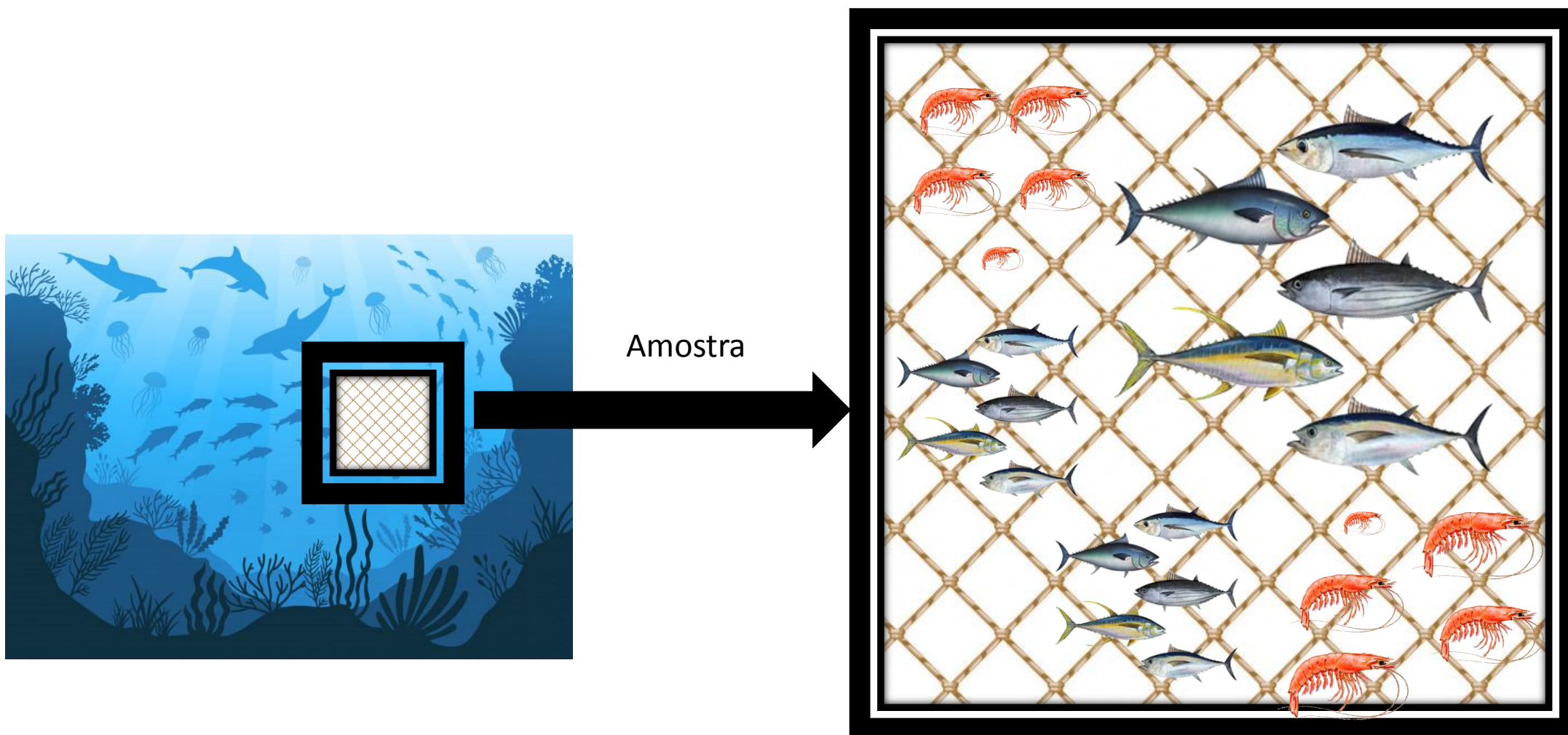
Estudo observacional



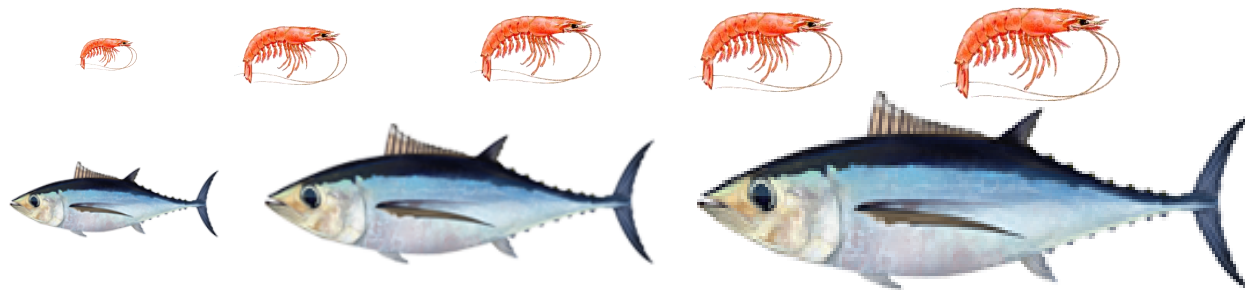
Ambientes
heterogêneos



Estudo observacional



Estudo observacional

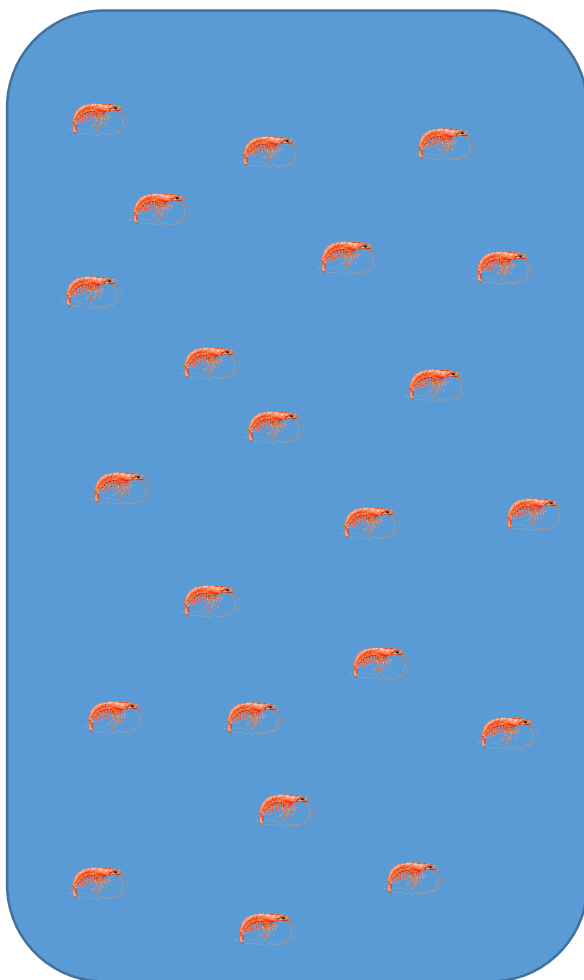


Faixa etária

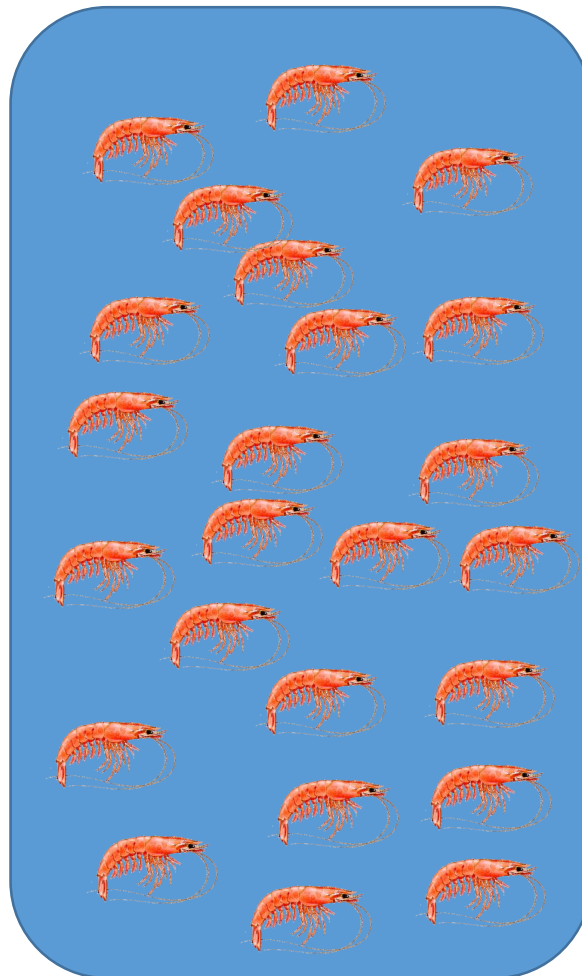


Estudo experimental

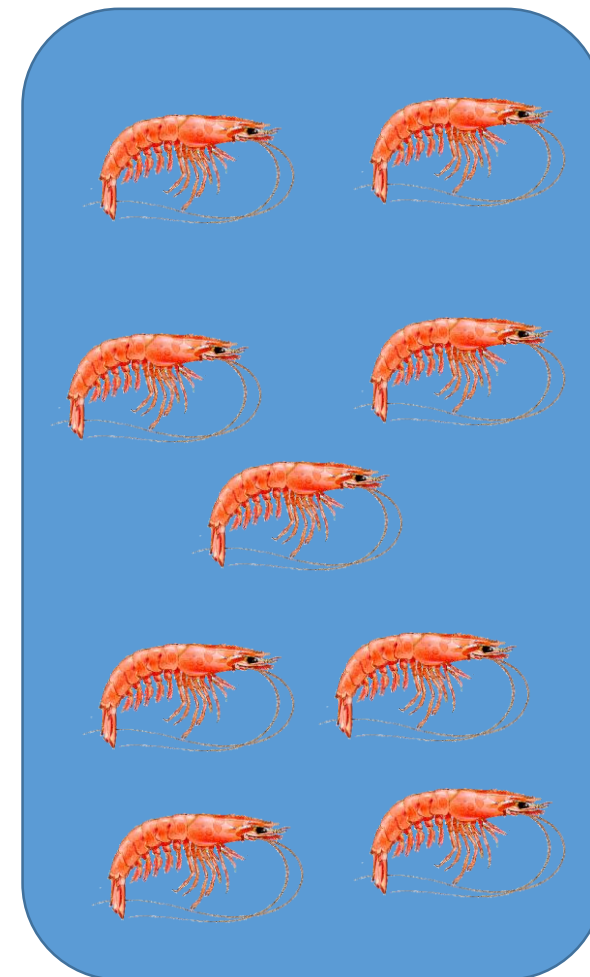
1 dia

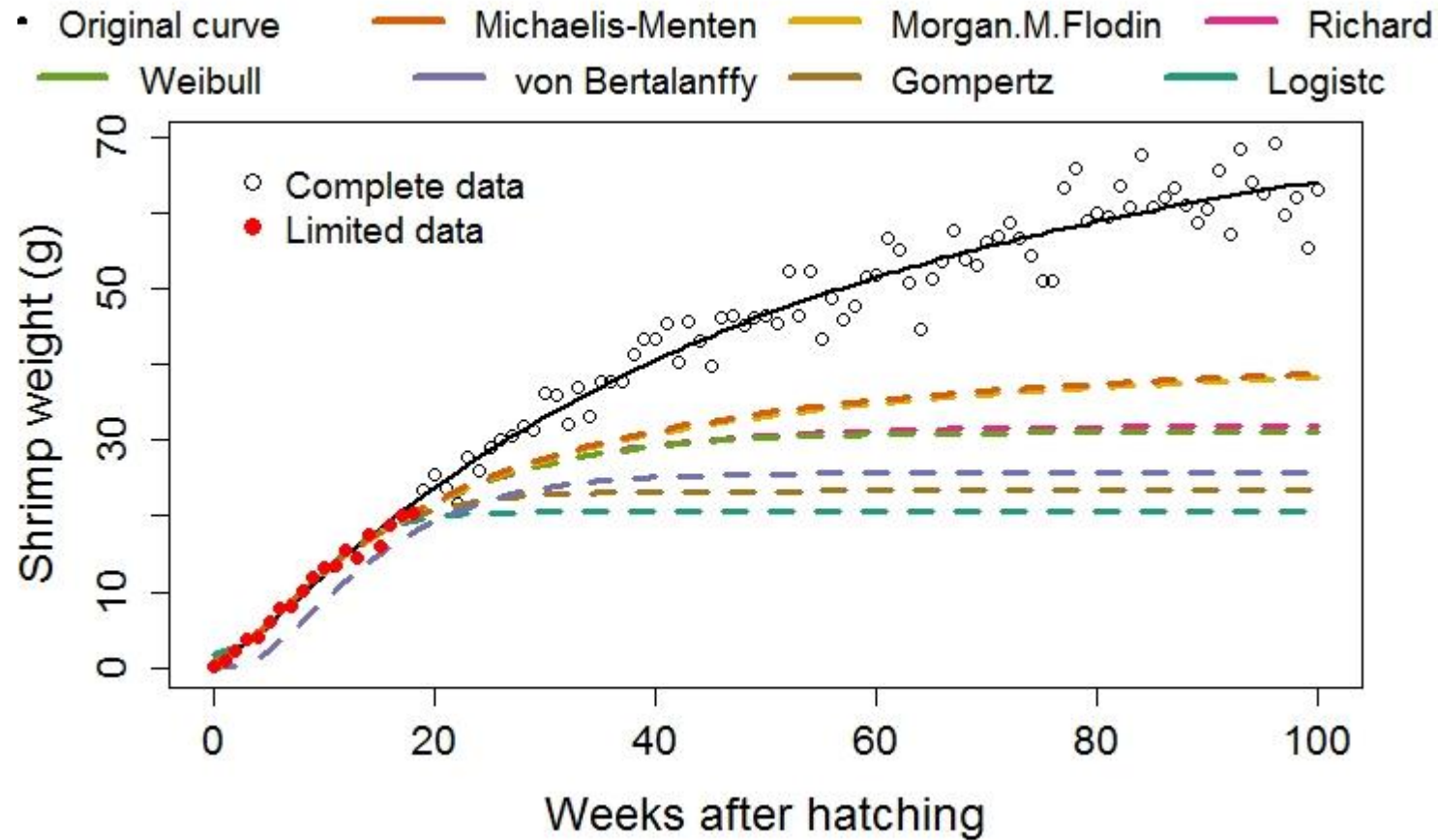


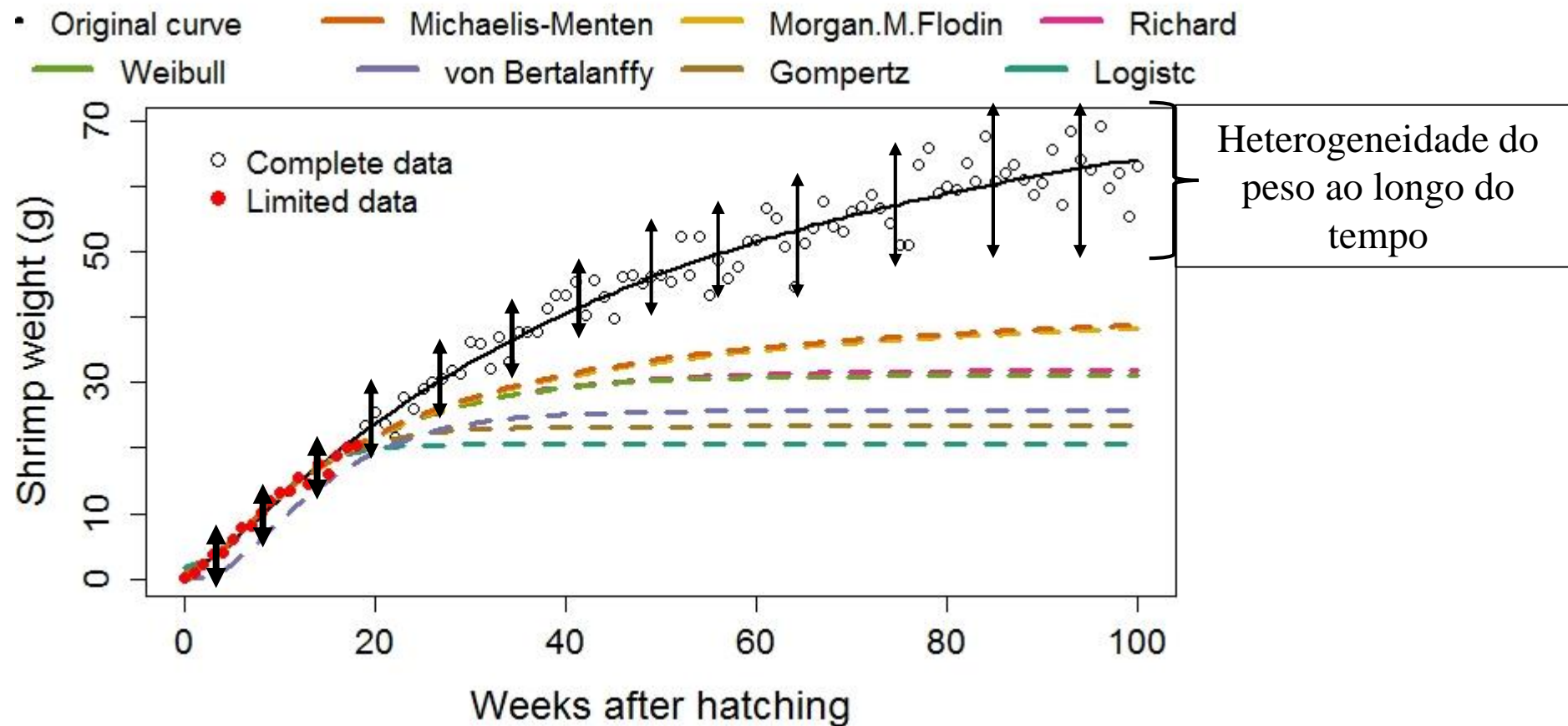
7 dias

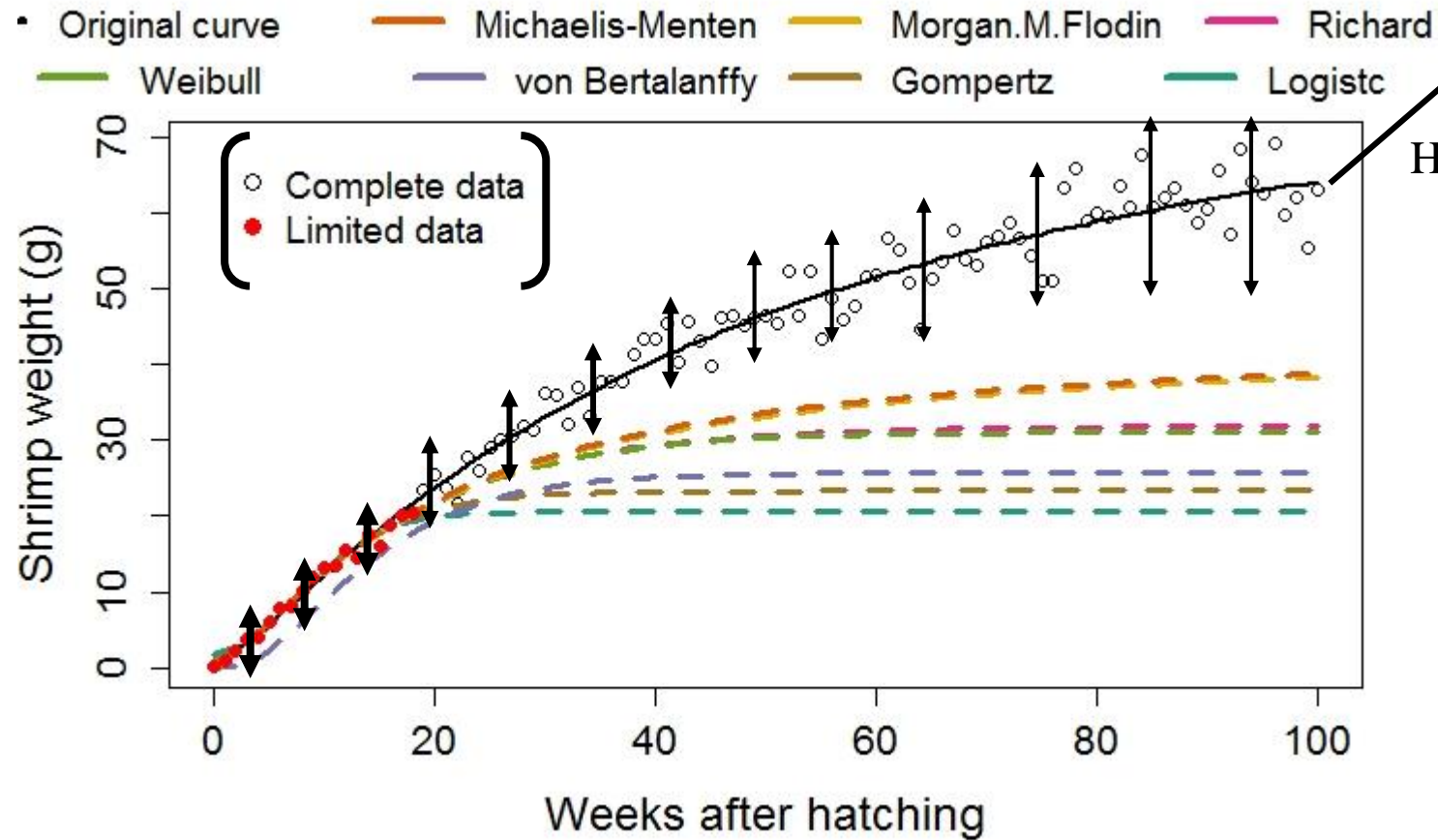


15 dias





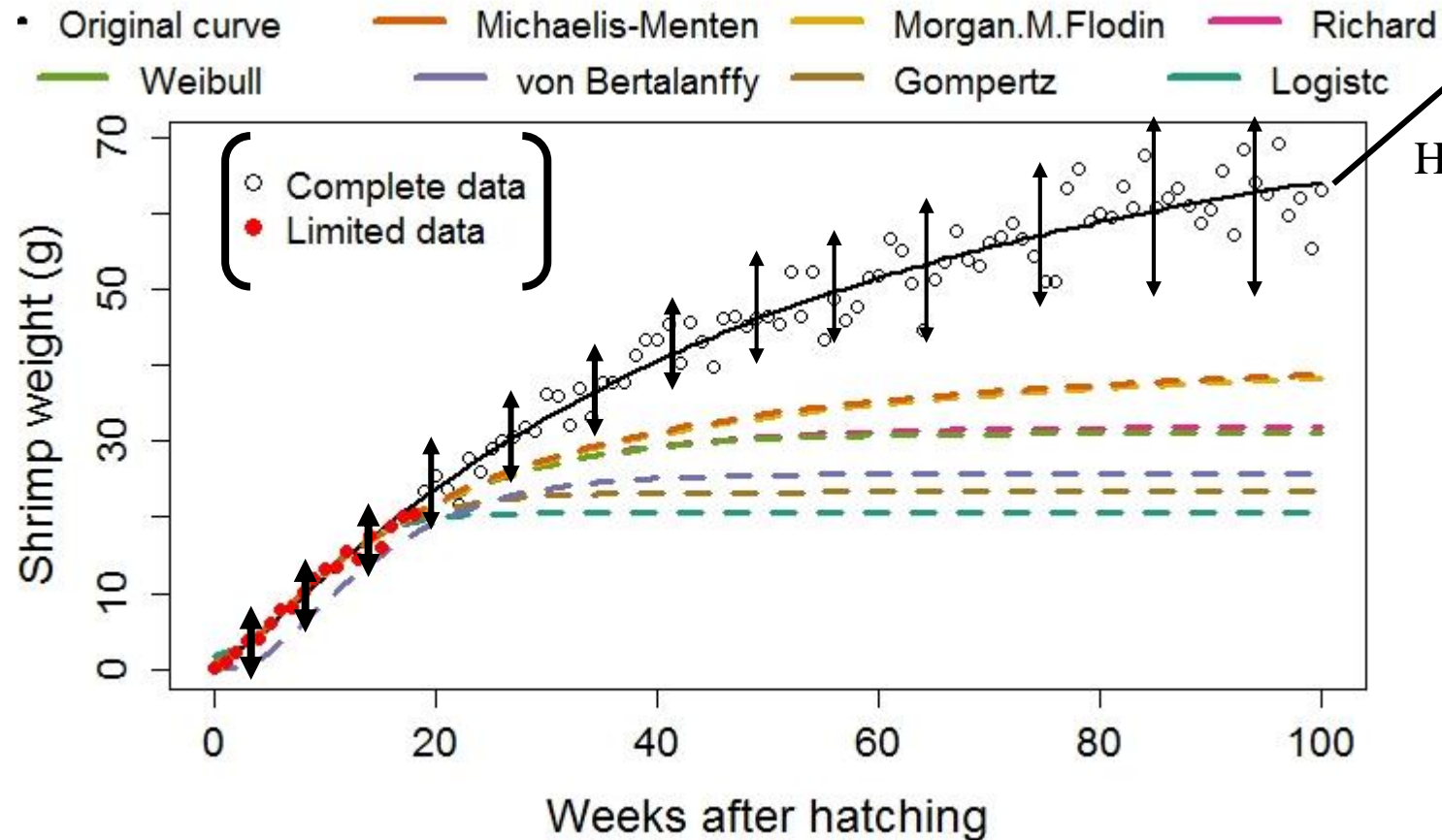




Heterogeneidade do peso ao longo do tempo

Dados simulados equação Michaelis-Menten generalizada

$$w(t) = \frac{w_0 \beta^\kappa + \alpha t^\kappa}{\beta^\kappa + t^\kappa} + \epsilon$$

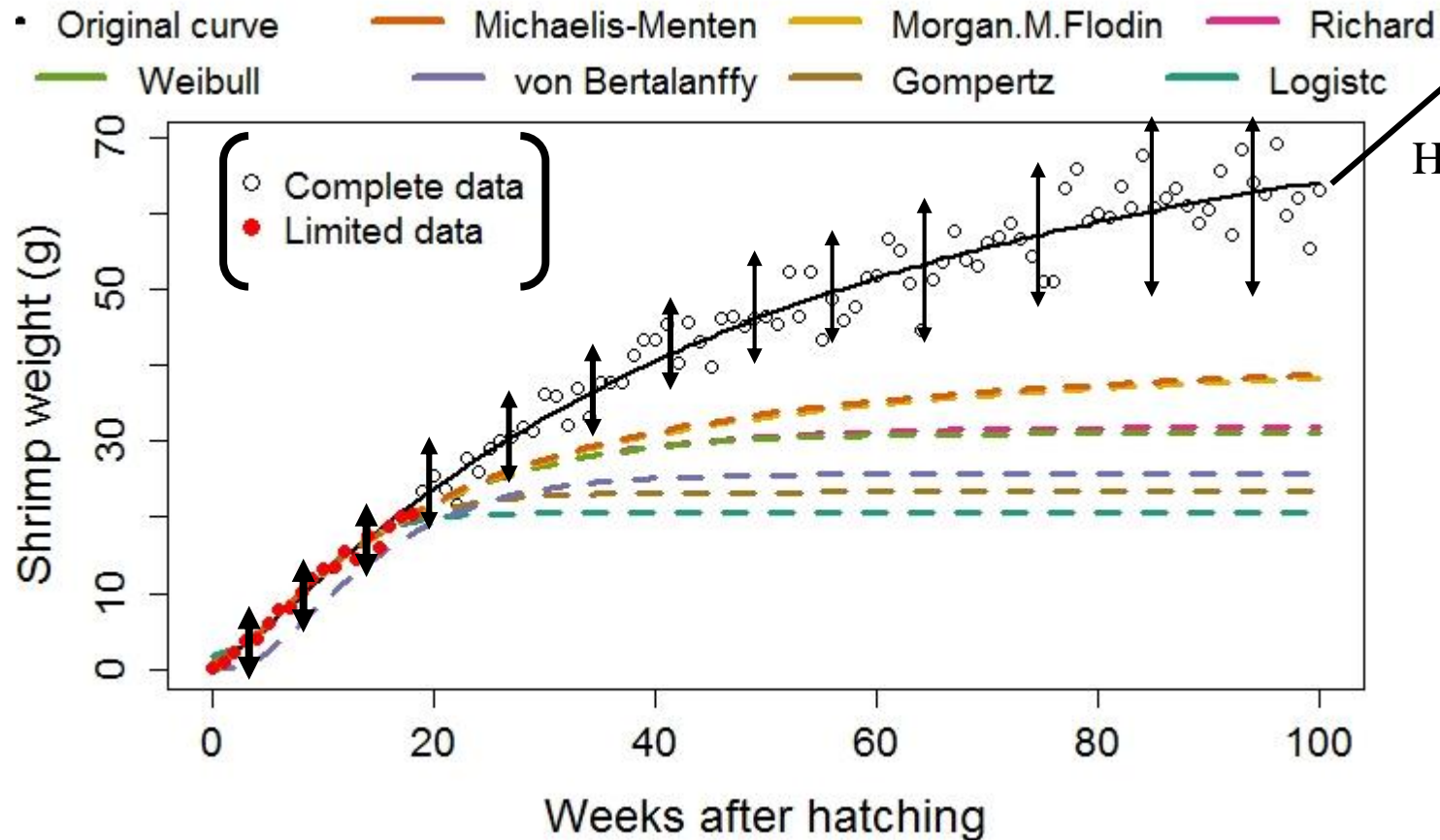


Heterogeneidade do peso ao longo do tempo

Dados simulados equação Michaelis-Menten generalizada

$$w(t) = \frac{w_0\beta^\kappa + \alpha t^\kappa}{\beta^\kappa + t^\kappa} + \epsilon$$

$\beta \Rightarrow$ Tempo (semana) animal atinge a média aritmética do peso



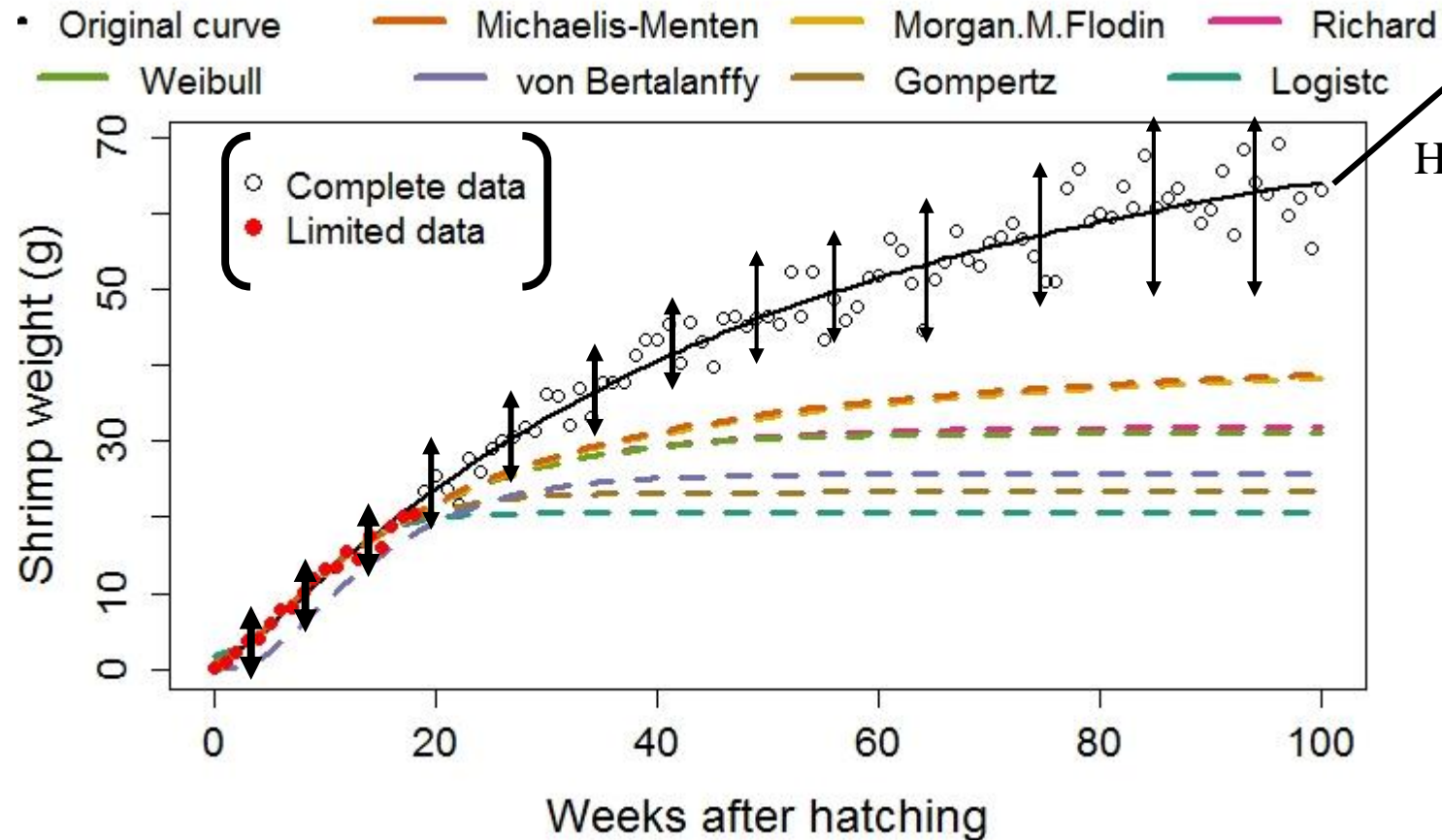
Heterogeneidade do peso ao longo do tempo

Dados simulados equação Michaelis-Menten generalizada

$$w(t) = \frac{w_0 \beta^\kappa + \alpha t^\kappa}{\beta^\kappa + t^\kappa} + \epsilon$$

$\beta \Rightarrow$ Tempo (semana) animal atinge a média aritmética do peso

$$w(t = \beta) = \frac{w_0 \beta^\kappa + \alpha \beta^\kappa}{\beta^\kappa + \beta^\kappa} = \frac{w_0 + \alpha}{2}$$



Heterogeneidade do peso ao longo do tempo

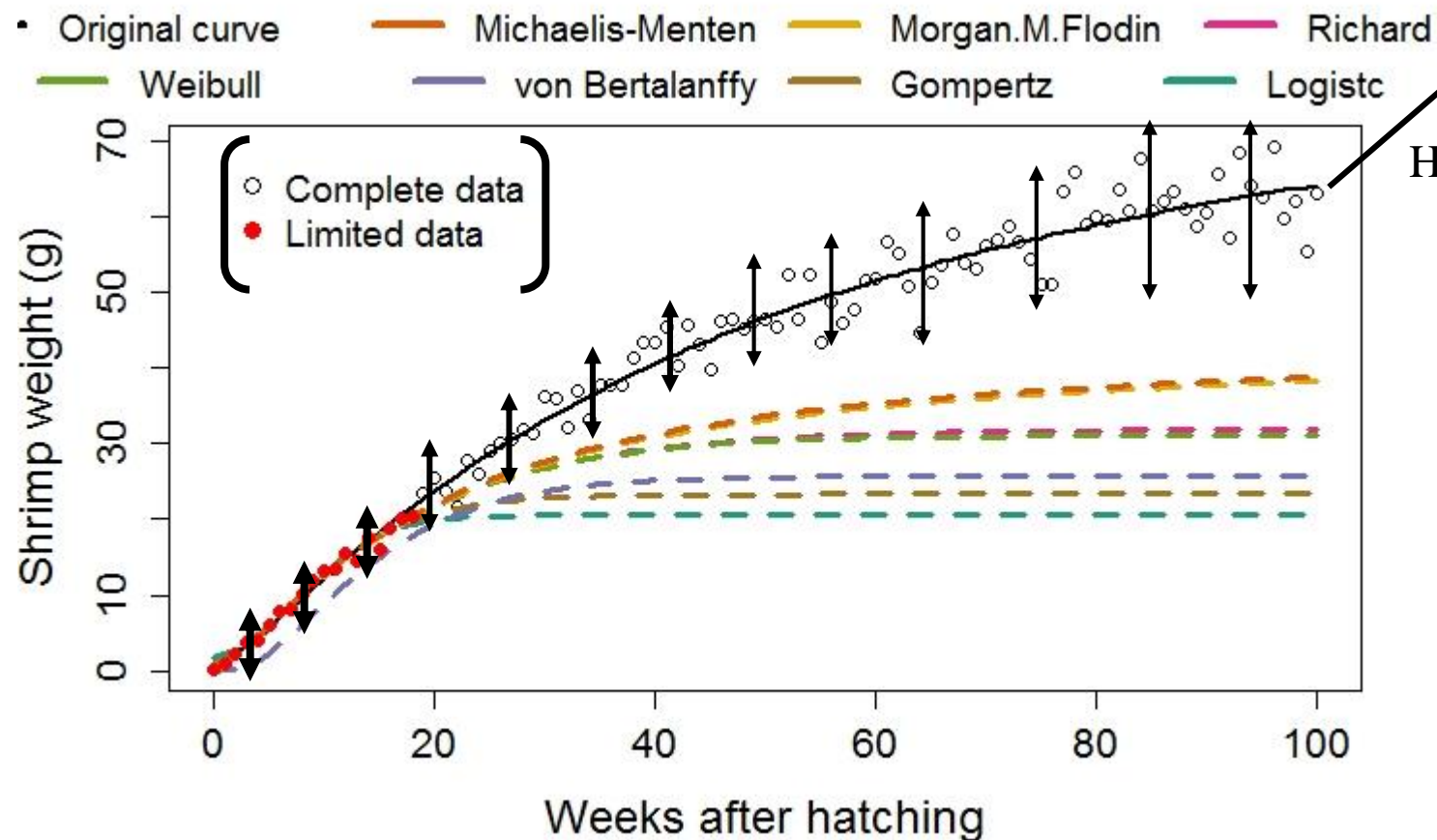
Dados simulados equação Michaelis-Menten generalizada

$$w(t) = \frac{w_0 \beta^\kappa + \alpha t^\kappa}{\beta^\kappa + t^\kappa} + \epsilon$$

β \Rightarrow Tempo (semana) animal atinge a média aritmética do peso

κ \Rightarrow Associado fortemente com o ponto de inflexão

$$\beta > 0 \text{ and } \kappa > 0$$



$$w(t) = \frac{w_0\beta^\kappa + \alpha t^\kappa}{\beta^\kappa + t^\kappa} + \epsilon$$

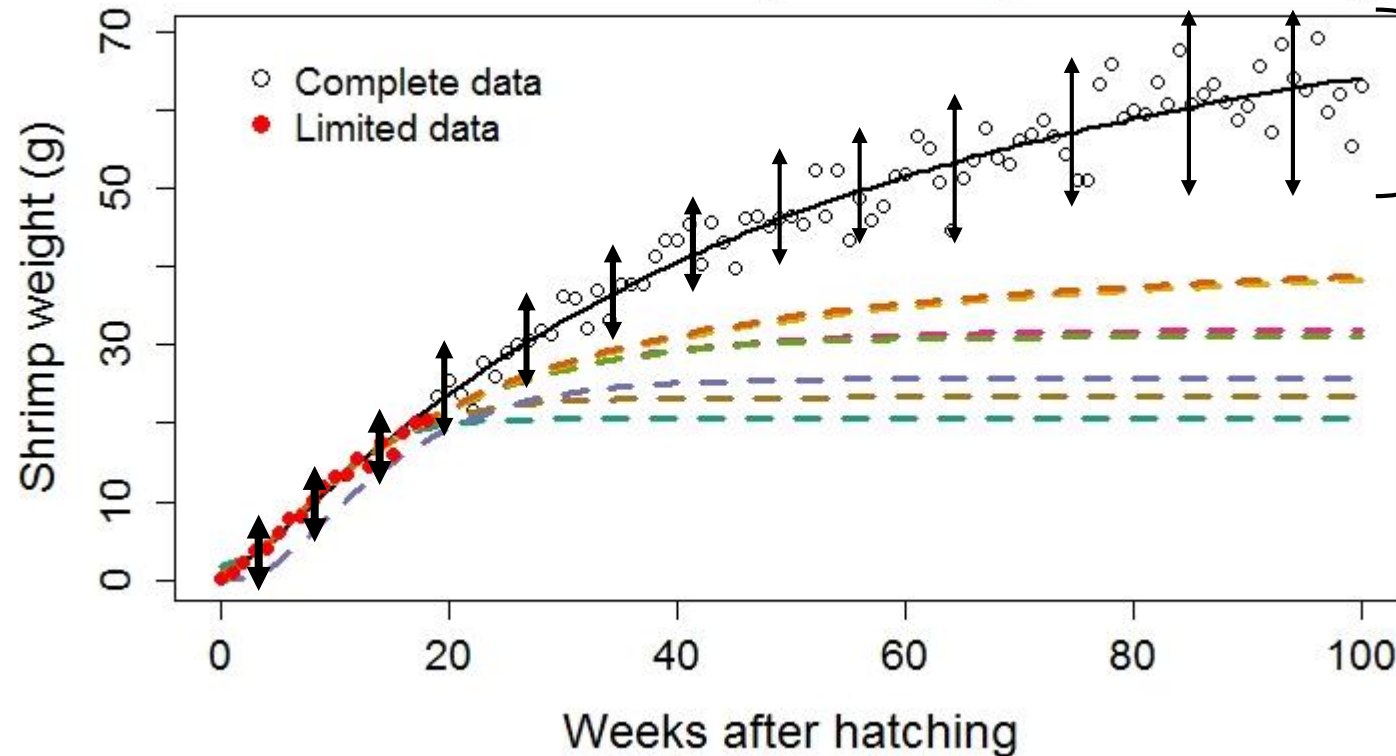
β \Rightarrow Tempo (semana) animal atinge a média aritmética do peso

κ \Rightarrow Associado fortemente com o ponto de inflexão

α \Rightarrow Peso assintótico teórico w_∞
 $t = \infty$

w_0 \Rightarrow Peso inicial teórico $t = 0$

- Original curve
- Michaelis-Menten
- Morgan.M.Flodin
- Richard
- Weibull
- von Bertalanffy
- Gompertz
- Logistic



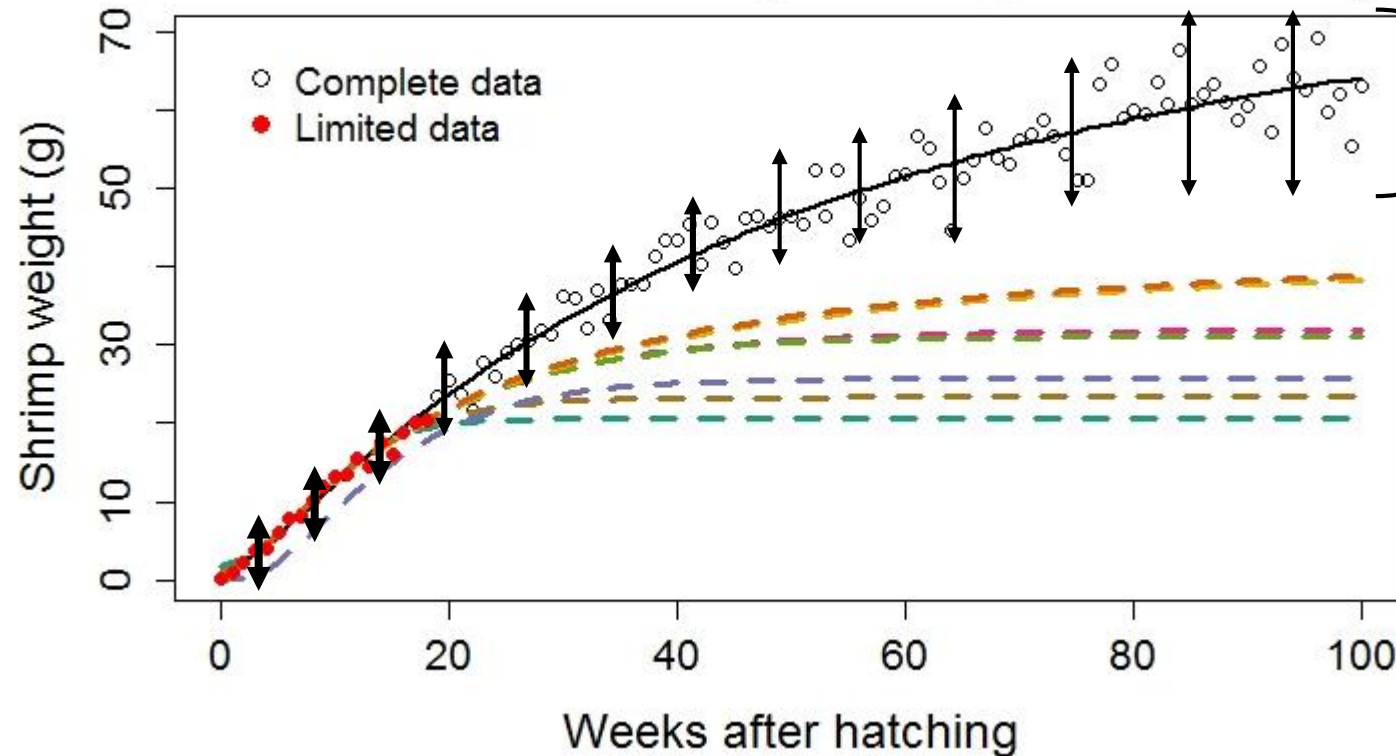
Dados simulados equação
Michaelis-Menten
generalizada

$$w(t) = \frac{w_0 \beta^\kappa + \alpha t^\kappa}{\beta^\kappa + t^\kappa} + \epsilon$$

Erro aleatório:

$$\epsilon \sim N(\mu, \sigma)$$

- Original curve
- Michaelis-Menten
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- Logistic



Heterogeneidade do peso ao longo do tempo

Dados simulados equação Michaelis-Menten generalizada

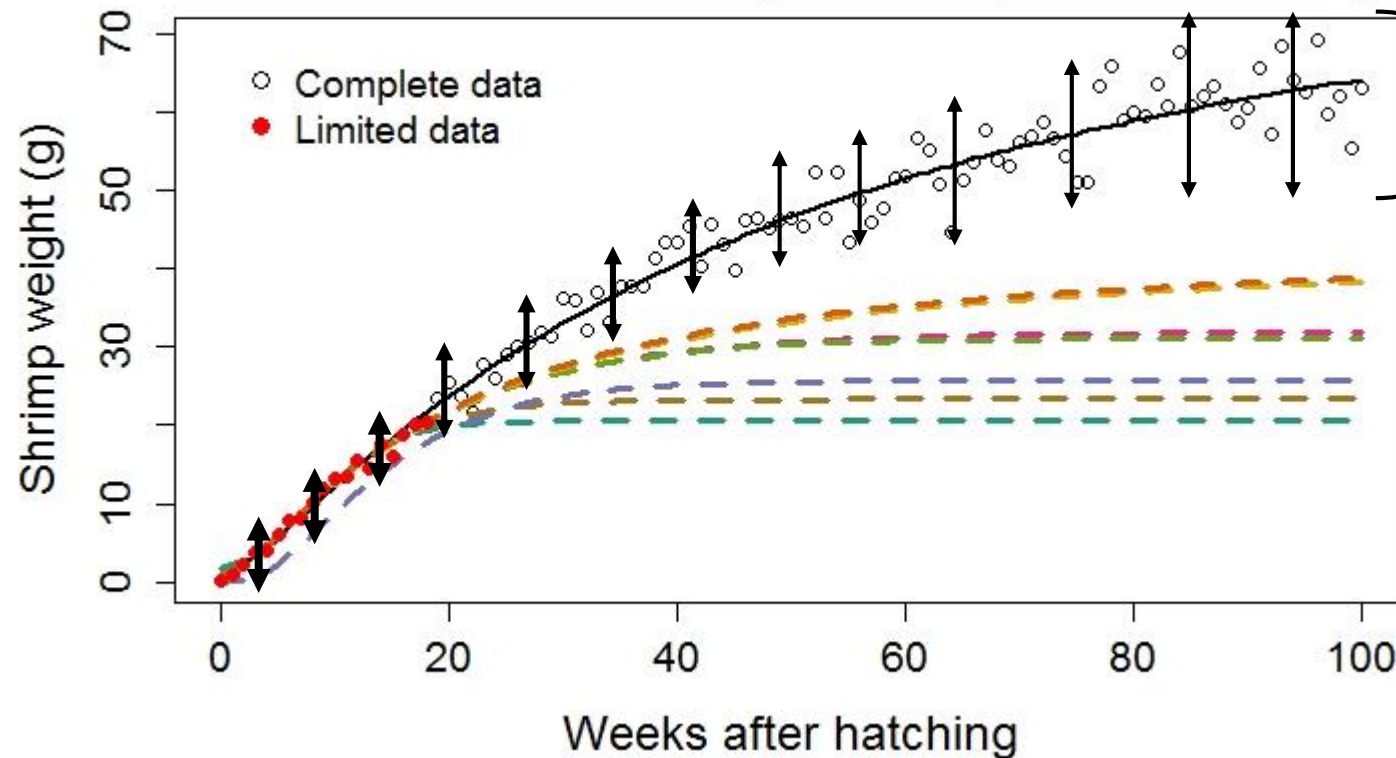
$$w(t) = \frac{w_0 \beta^\kappa + \alpha t^\kappa}{\beta^\kappa + t^\kappa} + \epsilon$$

Erro aleatório:

$$\epsilon \sim N(\mu, \sigma)$$

$$\mu = 0$$

- Original curve
- Michaelis-Menten
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Heterogeneidade do peso ao longo do tempo

Dados simulados equação Michaelis-Menten generalizada

$$w(t) = \frac{w_0 \beta^\kappa + \alpha t^\kappa}{\beta^\kappa + t^\kappa} + \epsilon$$

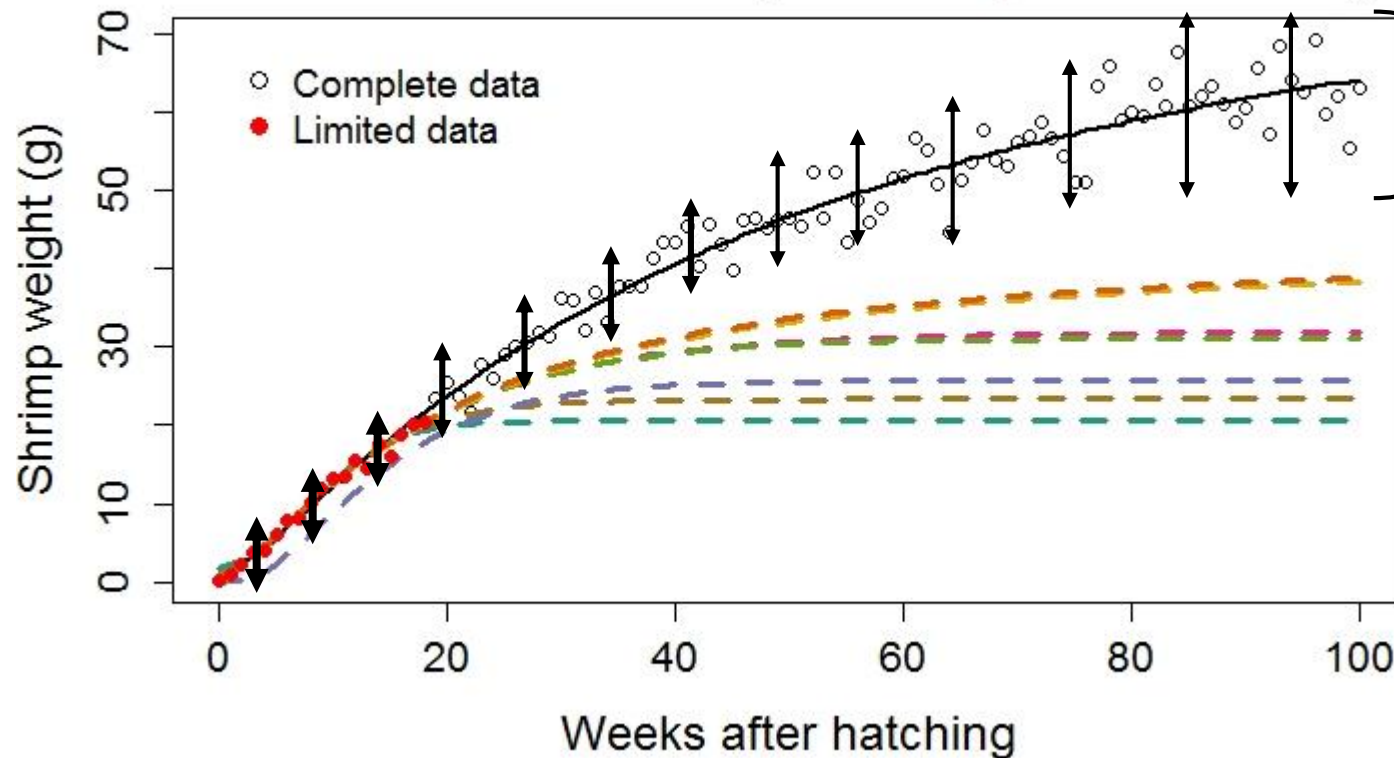
Erro aleatório:

$$\epsilon \sim N(\mu, \sigma)$$

$$\mu = 0$$

$$\sigma = \tau \cdot w(t)$$

- Original curve
- Michaelis-Menten
- Morgan.M.Flodin
- Richard
- Weibull
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Heterogeneidade do peso ao longo do tempo

Dados simulados equação Michaelis-Menten generalizada

$$w(t) = \frac{w_0 \beta^\kappa + \alpha t^\kappa}{\beta^\kappa + t^\kappa} + \epsilon$$

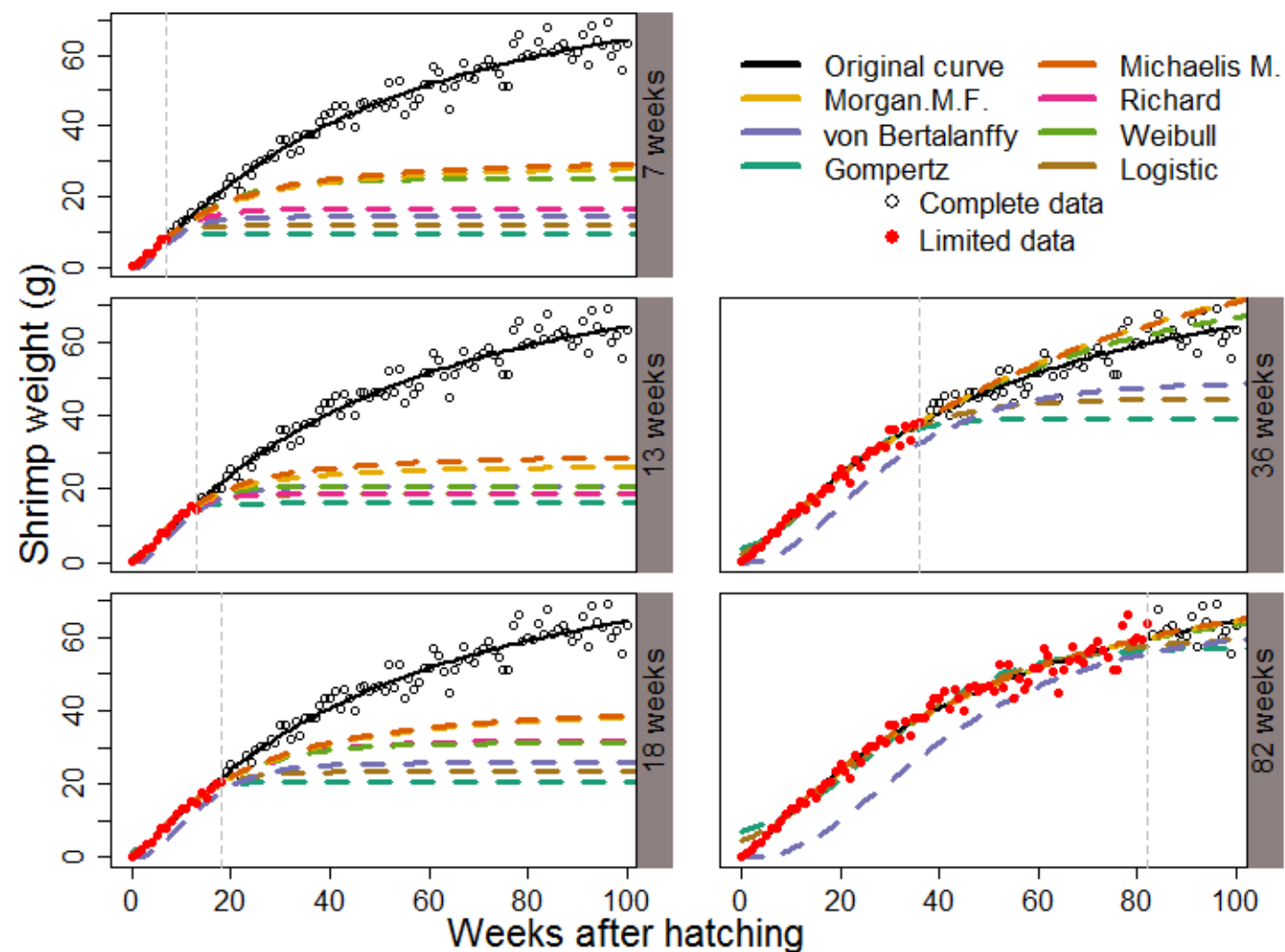
Erro aleatório:

$$\epsilon \sim N(\mu, \sigma)$$

$$\mu = 0$$

$$\sigma = \tau \cdot w(t)$$

$\tau \Rightarrow$ Parâmetro ponderador do peso



Limpar Environment →

```
rm(list = ls())  
#####  
# simulando dados  
#####  
set.seed(135)  
## Parametros  
w0 = 0.2  
w1 = 90.58  
kappa = 1.2 # 1.277  
beta = 47.7 # 41.24  
# Funcao Micaelis Menten  
mich <- function(x,w0=0.2,w1=90,kappa,beta){  
  y <- (w0*beta^kappa + w1*x^kappa)/(beta^kappa + x^kappa)  
  return(y)  
}  
x <- seq(0,100,1)  
y <- mich(x,w0,w1,kappa,beta)
```


Fixar uma semente



```
rm(list = ls())
#=====
# simulando dados
#=====
set.seed(135)
## Parametros
w0 = 0.2
w1 = 90.58
kappa = 1.2 # 1.277
beta = 47.7 # 41.24
# Funcao Michaelis Menten
mich <- function(x,w0=0.2,w1=90,kappa,beta){
  y <- (w0*beta^kappa + w1*x^kappa)/(beta^kappa + x^kappa)
  return(y)
}
x <- seq(0,100,1)
y <- mich(x,w0,w1,kappa,beta)
```

Modelo M-M



$$w(t) = \frac{w_0 \beta^\kappa + \alpha t^\kappa}{\beta^\kappa + t^\kappa} + \epsilon$$

```
rm(list = ls())
#=====
# simulando dados
#=====
set.seed(135)
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w0 = 0.2
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  return(y)
}
x <- seq(0,100,1)
y <- mich(x,w0,w1,kappa,beta)
```

Parâmetros do M-M



```
rm(list = ls())
#=====
# simulando dados
#=====
set.seed(135)
## Parametros
w0 = 0.2
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kappa = 1.2 # 1.277
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  return(y)
}
x <- seq(0,100,1)
y <- mich(x,w0,w1,kappa,beta)
```

Gerando dados
determinístico



```
rm(list = ls())
#=====
# simulando dados
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set.seed(135)
## Parametros
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  return(y)
}
x <- seq(0,100,1)
y <- mich(x,w0,w1,kappa,beta)
```

```
rm(list = ls())
#=====
# simulando dados
#=====
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## Parametros
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mich <- function(x,w0=0.2,w1=90,kappa,beta){
  y <- (w0*beta^kappa + w1*x^kappa)/(beta^kappa + x^kappa)
  return(y)
}
x <- seq(0,100,1)
y <- mich(x,w0,w1,kappa,beta)
```

```
# selecionando dados limitados ou incompletos
df <- data.frame(time = x, peso = mich(x,w0,w1,kappa,beta)+rnorm(n = length(x),sd=0.08*y,))
df[which(df$time<=7),]
```

```
rm(list = ls())
#=====
# simulando dados
#=====
set.seed(135)
## Parametros
w0 = 0.2
w1 = 90.58
kappa = 1.2 # 1.277
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df <- data.frame(time = x, peso = mich(x,w0,w1,kappa,beta)+rnorm(n = length(x),sd=0.08*y,))
df[which(df$time<=7),]
```

Vamos para o R software!

Simulação de dados incompletos/limitados como indícios de subestimação dos parâmetros nos modelos não lineares de crescimento.

MUITO OBRIGADO!!!

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https://www.youtube.com/channel/UC0aJ_xgty6efYmCy-9PJUYA?view_as=subscriber

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