



# PIBEE

AN INDEX FOR BEEKEEPING EVALUATING



Conselho Nacional de Desenvolvimento  
Científico e Tecnológico







# UNIVERSIDADE FEDERAL RURAL DO RIO DE JANEIRO-Brazil



**Welcome to UFRRJ - Brazil**



# Introduction

## The Importance of Surveys

- To identify barriers that limit this sector
- To prepare researches, diagnosis
- To improve productivity
- As a goal for the development

## Using Indices

- To make direct assessment
- To reduce the time of diagnosis
- The application is easier to understand







# Introduction

## **PIBee - Performance Index for Beekeeping**

An index for evaluating  
beekeeping technology in different levels.

## **PIBee 's Diagnosis**

Easy acessibility

An instrument of technical assistance and  
self-assessment of the activity.



# Introduction

## PIBEE's Levels

From basic to advanced

Micro and macroregions

For producers & technicians

Companies & governments





# Methodology

## Study Site

The state of Rio de Janeiro,



## A Survey

Interviews made by technicians

401 beekeepers were evaluated in the field

264 questions

- socio-economic conditions
- their keeping





# Methodology

$$Z_i = p_i w_i \quad \text{and} \quad L_i = \text{MAX} (p_i)$$

The PIBee is the ratio of the sum  $Z_i$  over the sum  $L_i$ .  
The equation follows:

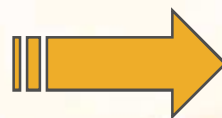
$$PIBee = \frac{\sum_{i=1}^n Z_i}{\sum_{i=1}^n L_i}, \text{ so the PIBee ranges between 0 and 1}$$



# Methodology

## PIBee calculation

Statistical model and analysis exploratory

 ranging from 0 to 1





# Methodology

PIBee Scores	Classification	Proceedings
<b>0 ~ 0.50</b>	<b>Weak</b>	Immediate technical support
<b>0.51 ~ 0.75</b>	<b>Regular</b>	Technical support
<b>0.76 ~ 1.00</b>	<b>Satisfactory</b>	High level of production



# Methodology

## Diagnosis

- Overall situation
- Issues about beekeeping





# Methodology

## Issues

- Location, arrangement of the apiary
- Acquiring or collecting swarms
- Handling hives and production





# Methodology

For example

Let a beekeeper which apiary had the following characteristics:


$-w_1 =$  Use roves on hives. So,  $p_1 = 1$

$-w_2 =$  The revision is done by morning. So,  $p_2 = 1$

$-w_3 =$  Use pesticide in the apiary. So,  $p_3 = 0$

Therefore, applying the PIBee formula to evaluate, we have:

$$PIBee = \frac{\sum_{i=1}^n Z_i}{\sum_{i=1}^n L_i} = \frac{1 + 1 + 0}{1 + 1 + 1} = \frac{2}{3} = 0.66$$

  
Regular





# Methodology

## Proposal Diagnosis

**The target**  
**Losses of hives**

**Hypothesis**  
Region A could have  
major problems

## The Arrangement

**Group a**

High  
losses

n= 27  
counties

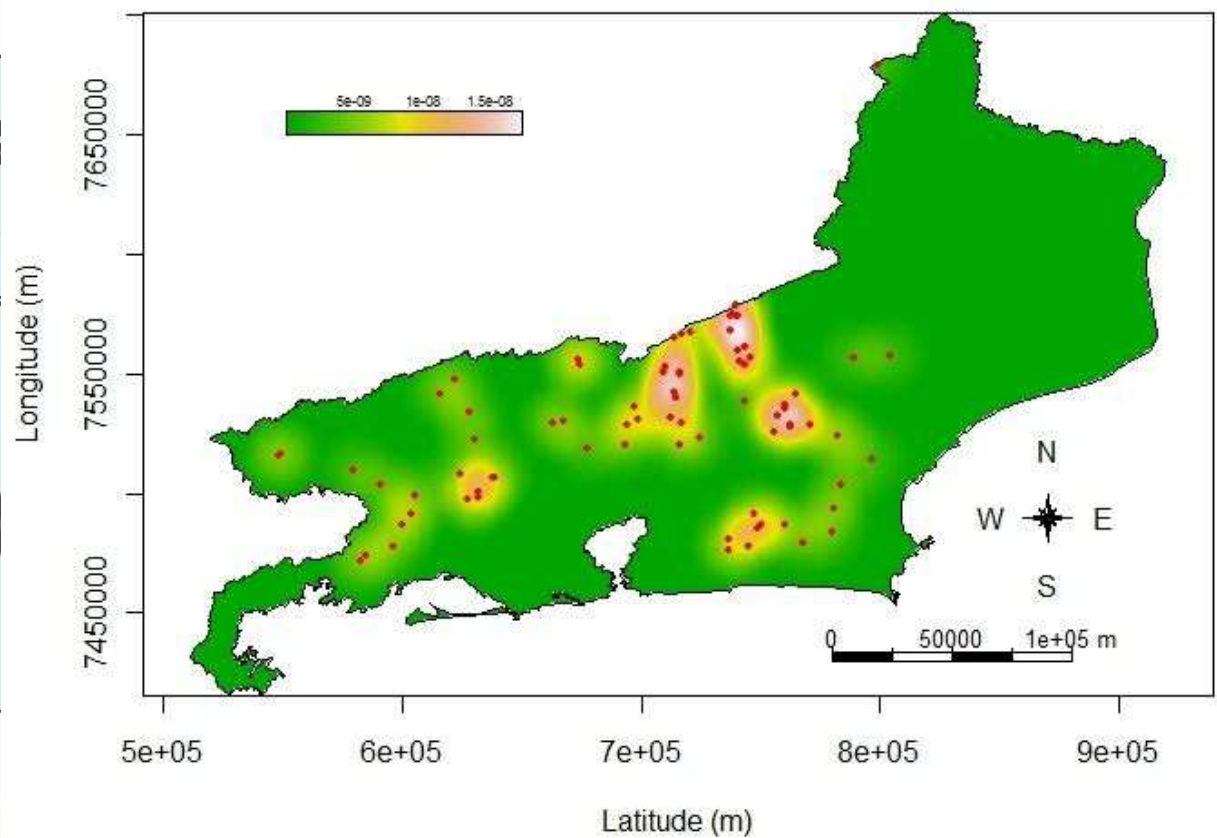
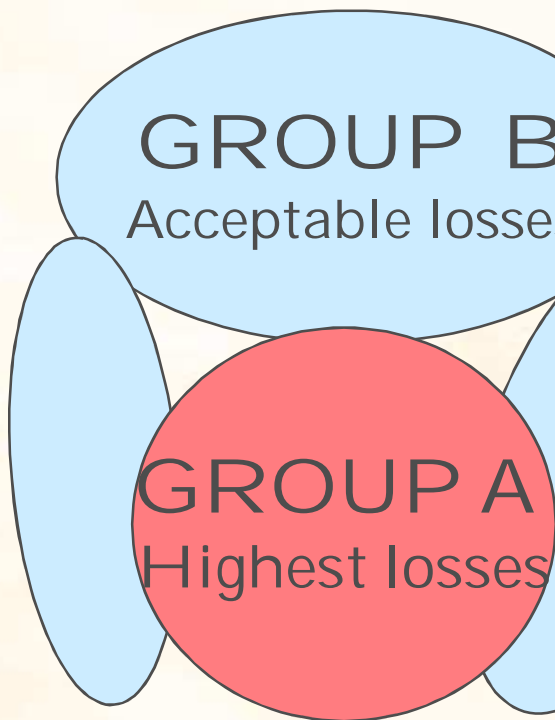
**Group b**

Acceptable  
losses

n= 9  
counties

# Methodology

CASE to DIAGNOSIS







# Methodology

## Analysis

All statistical analysis were performed with the statistical package R.

## Aim

To identify aspects of bee management which are determinants of health

To use as a guide to assist in reducing losses

# Results

## Overall Analysis

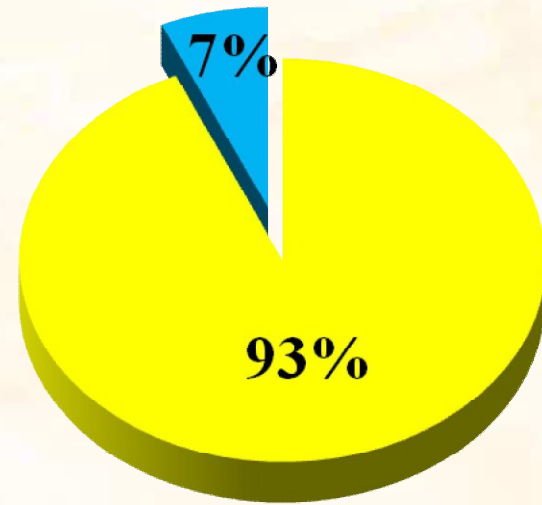


■ Regular

### Region A

**PIBee 0.62**

[0,60 ~ 0.64]



■ Regular  
■ Satisfactory

### Region B

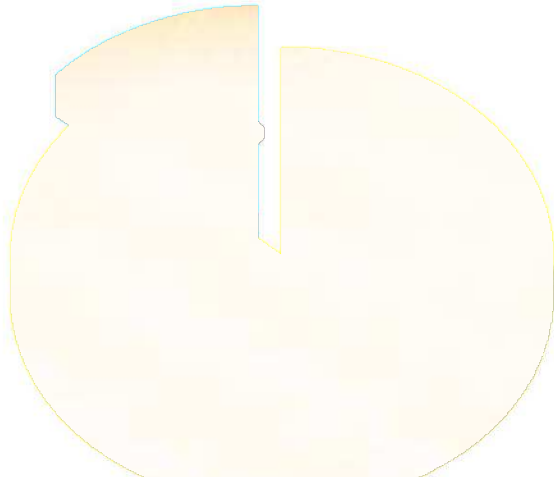
**PIBee 0.65**

[0,63 ~ 0.68]



# Results

## Apiary Arrangement



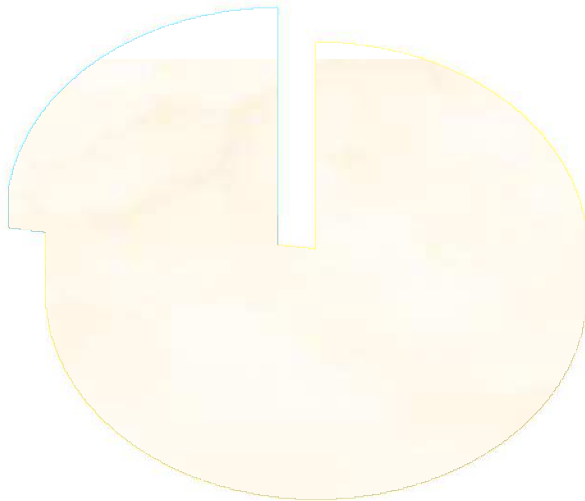
Regular  
Satisfactory



### Region A

**PIBee 0.64**

[0,6 ~ 0.68]



Regular  
Satisfactory



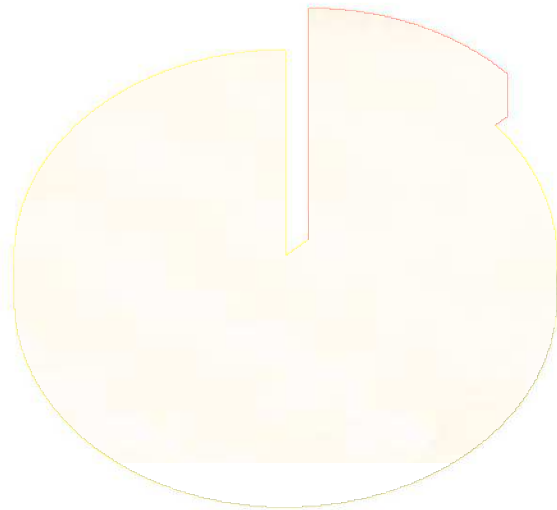
### Region B

**PIBee 0.69**

[0,66 ~ 0.73]

# Results

## Acquaring swarms



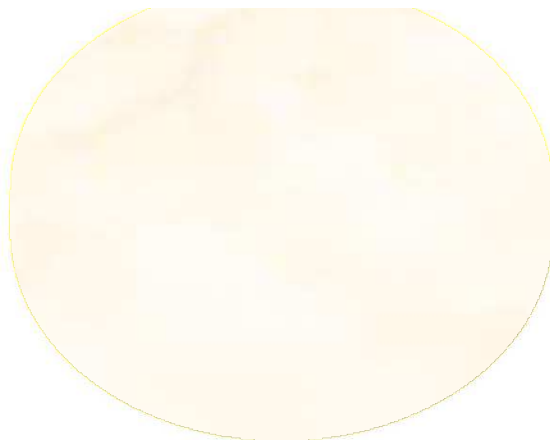
Regular  
Weak



### Region A

**PIBEE 0.62**

[0,59 ~ 0.65]



Regular



### Region B

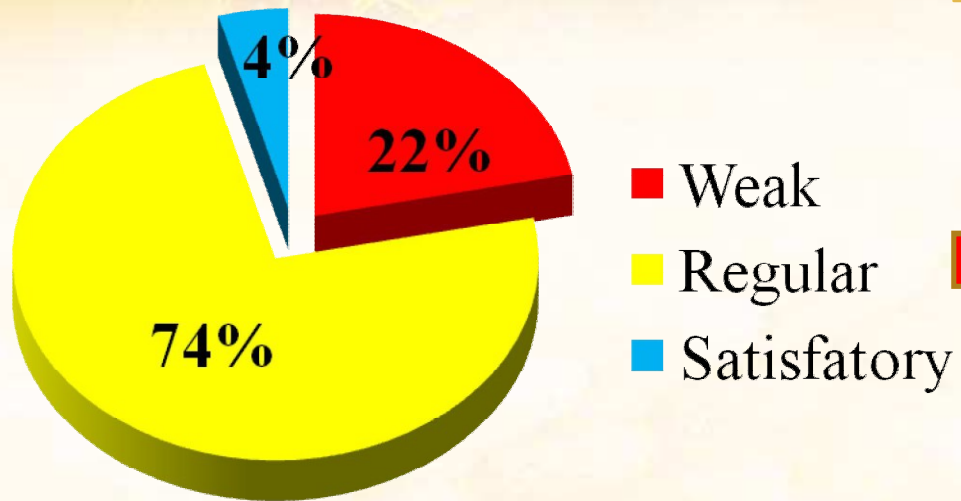
**PIBEE 0.65**

[0,66 ~ 0.673]



# Results

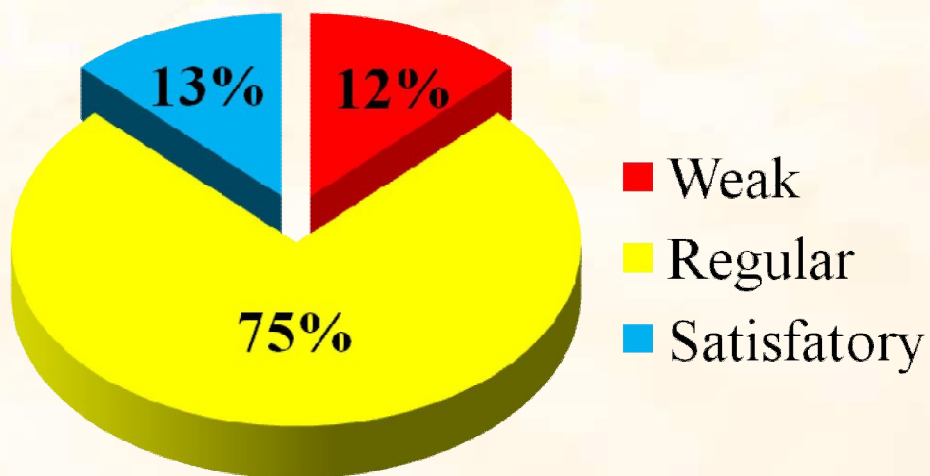
## Handling the hives



### Region A

**PIBEE 0.58**


[0,53 ~ 0.63]



### Region B

**PIBEE 0.63**

[0,57 ~ 0.69]



# Results

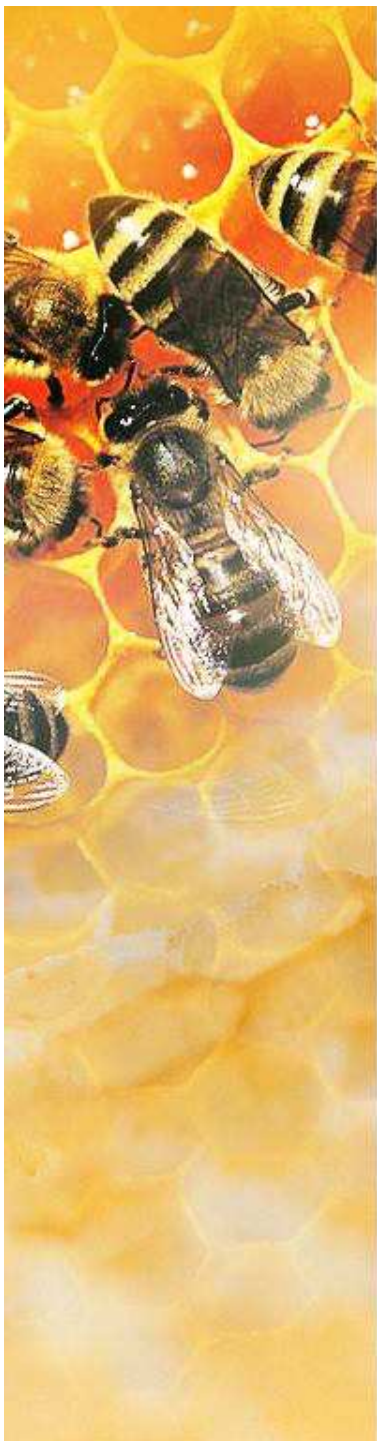
<b>Factors of Productivity (average)</b>	<b>Region A</b>	<b>Region B</b>
Honey yield/hive /year (kg)	12,4kg	12,2kg
Hives per beekeeper	26	31
Beekeepers with losses (%)	38%	19%
Beekeepers with bee illness (%)	42%	28%
Beekeepers with technical training (%)	68%	66%
Adoption cooperativism (%)	29%	47%
Technical support (%)	25%	17%





# Conclusions

- Technical control in region A (high losses) immediatley
- Interstate policy to mitigate the losses
- Researches to identy the pest or pathogens
- A guideline to beekeepers
- The local industry might be own policies and procedures



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# Thanks

