Presentation: Hannes Oberreiter, version: 2021-04-12

Beekeeper Crowdsourcing Data

Analysis of varroacide expenses and honey bee colony winter mortality on operation level in Austria

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Why?

- Imported aggressor *Varroa destructor*
  - High varroa mite infestation ~ greatest potential to raise winter colony losses (Morawetz, et al. 2019)
- Varroa control methods
  - Differ in effect and usage distribution (Oberreiter and Brodschneider, 2020)
- Novel descriptive analysis of treatment expenses

Why?

- Imported aggressor *Varroa destructor*
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How?

- Cooperation with the yearly colony loss survey
- Crowd sourced data of three winters

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Question:
  Estimated treatment expenses per colony without labor costs?
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1. DS

Descriptive Statistics

1. Quantitative Numbers
2. Central Tendencies of Survey Expenses
3. Distribution of Cohorts
4. Estimate of Expenses (Input Validation)

1 DS

1.1 Quantitative Numbers

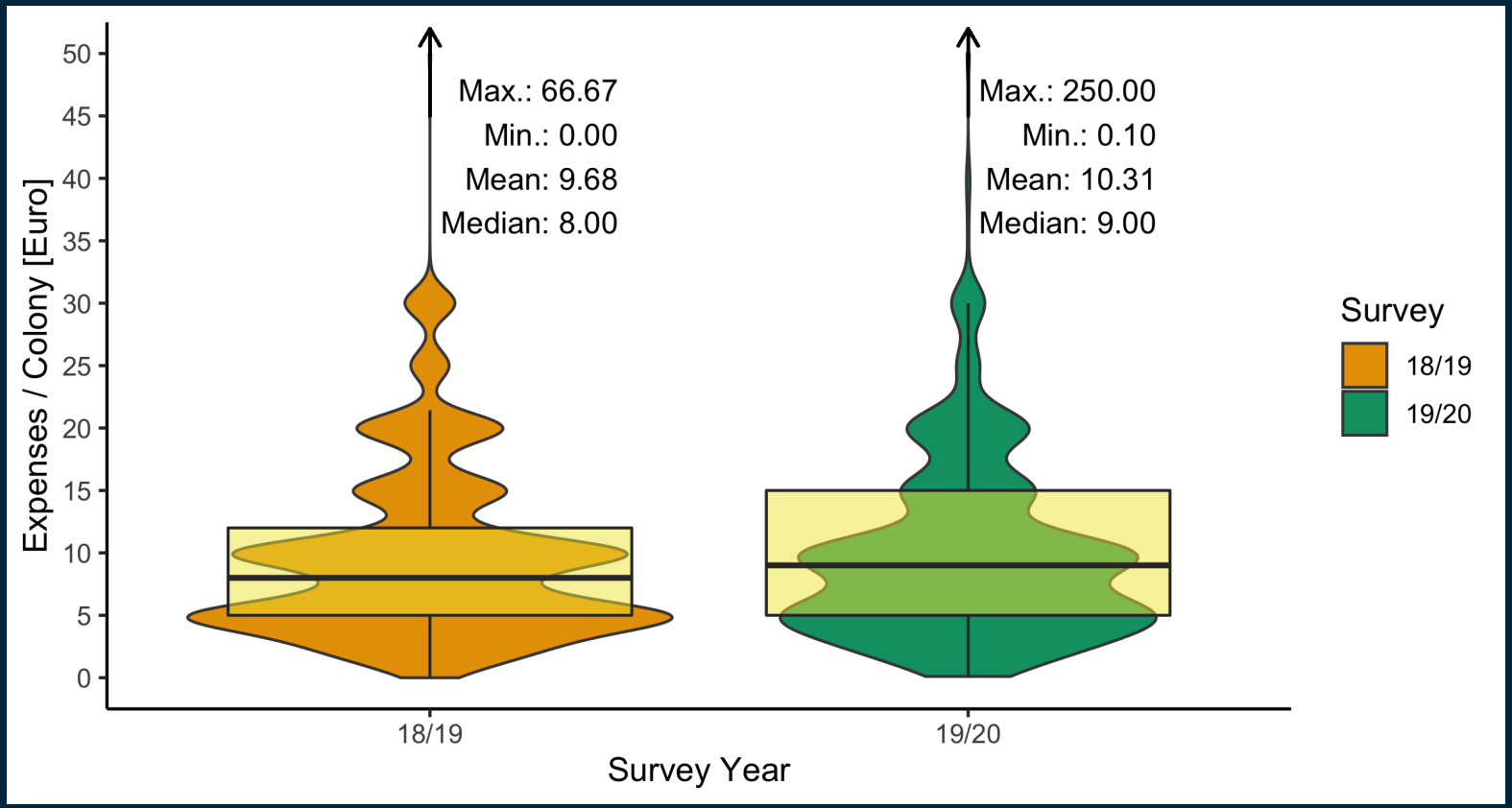
- ~ 4% of registered beekeepers*

Year	Survey [n]	Answered Expenses [n]	Percent [%]
18/19	1.534	1.195	77.9
19/20	1.539	1.170	76.0

*Compared to the number of registered beekeeper and honey bee colonies with the national beekeeping association Biene Österreich

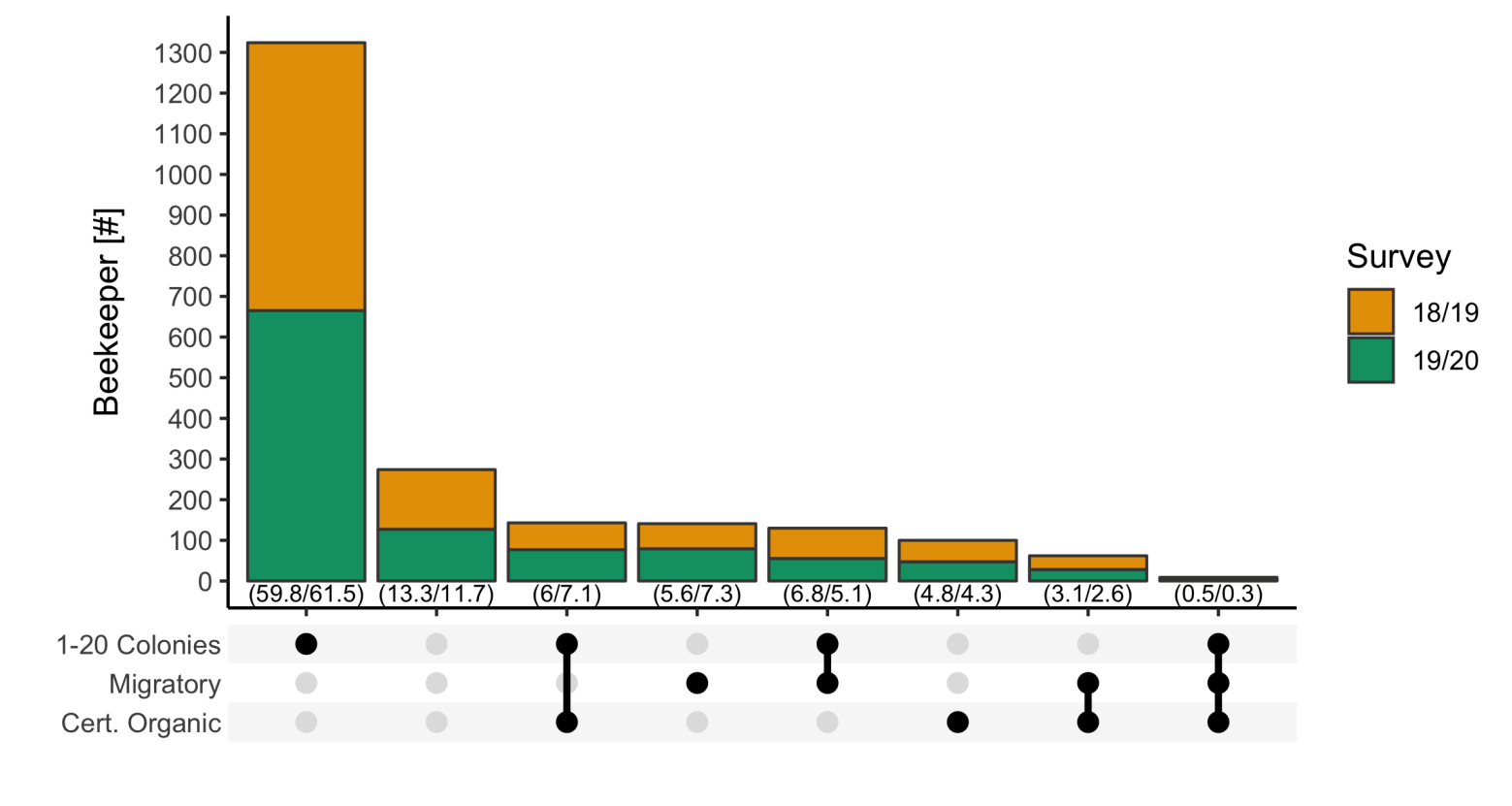
1 DS

1.2 Central Tendencies of Survey Expenses



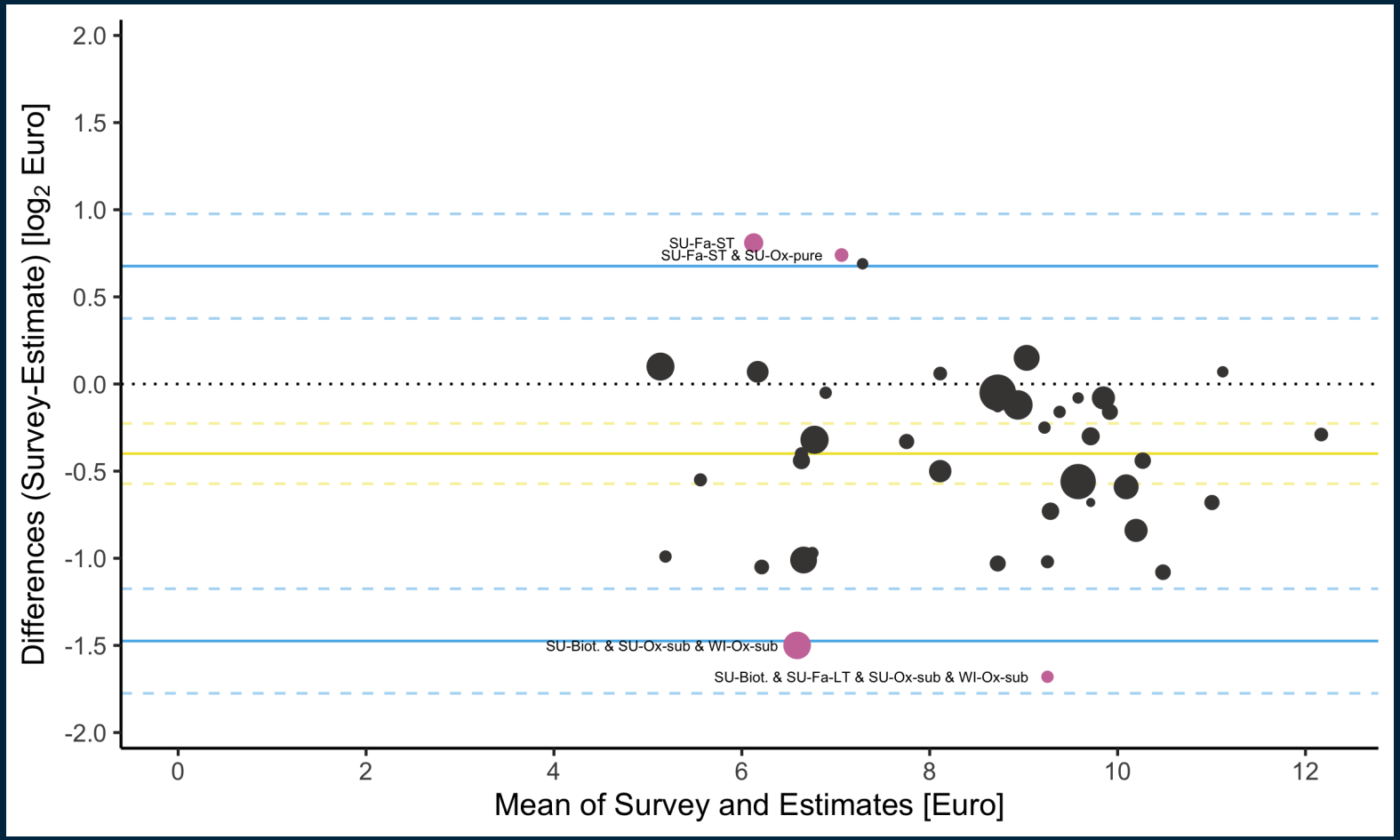
1 DS

1.3 Distribution of Cohorts



1 DS

1.4 Estimate of Expenses (Input Validation)



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1. DS

2. EDA

Exploratory Data Analysis

1. Single Factor
2. Extrapolation of total Expenses

2 EDA

2.1 Single Factor

- Operation Size
    - Hobby Beekeeper spend **more** (< Colonies)
    - No difference between medium and large Operations (20-50, >50 Colonies)
    - ~5 Euro / Colony difference (Median)

2 EDA

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  - Hobby Beekeeper spend **more** (< Colonies)
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- Migratory Beekeeper
  - spend **less**
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  - without treatment effect, no difference in survey 18/19

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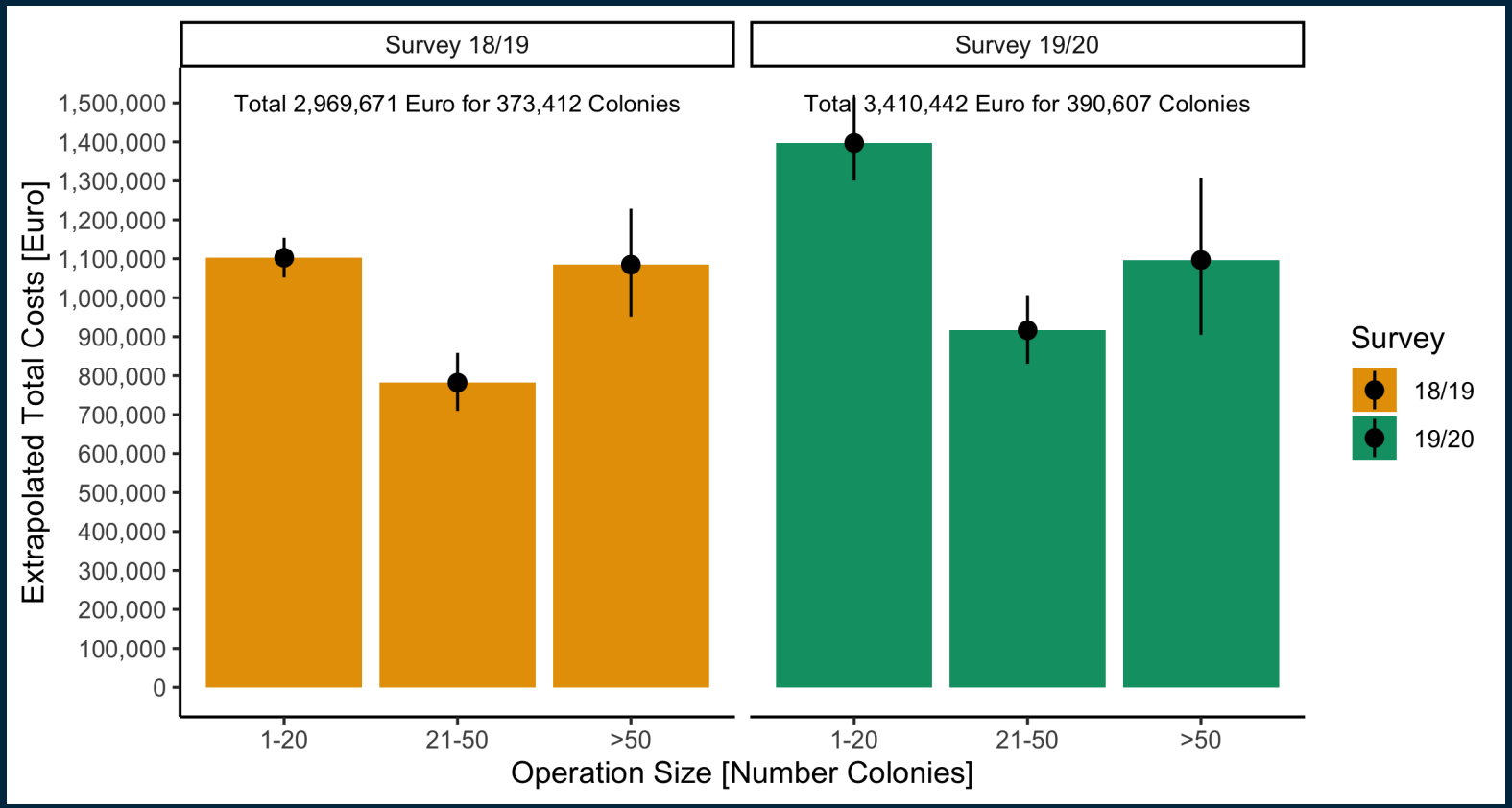
- Operation Size
  - Hobby Beekeeper spend **more** (< Colonies)
  - No difference between medium and large Operations (20-50, >50 Colonies)
  - ~5 Euro / Colony difference (Median)
- Migratory Beekeeper
  - spend **less**
  - ~3-4 Euro / Colony difference (Median)
  - without treatment effect, no difference in survey 18/19
- Certified Organic Beekeeper
  - spend **less**
  - ~4 Euro / Colony difference (Median)
  - without treatment effect, low effect size

2 EDA

2.2 Extrapolation of Total Expenses



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Summary

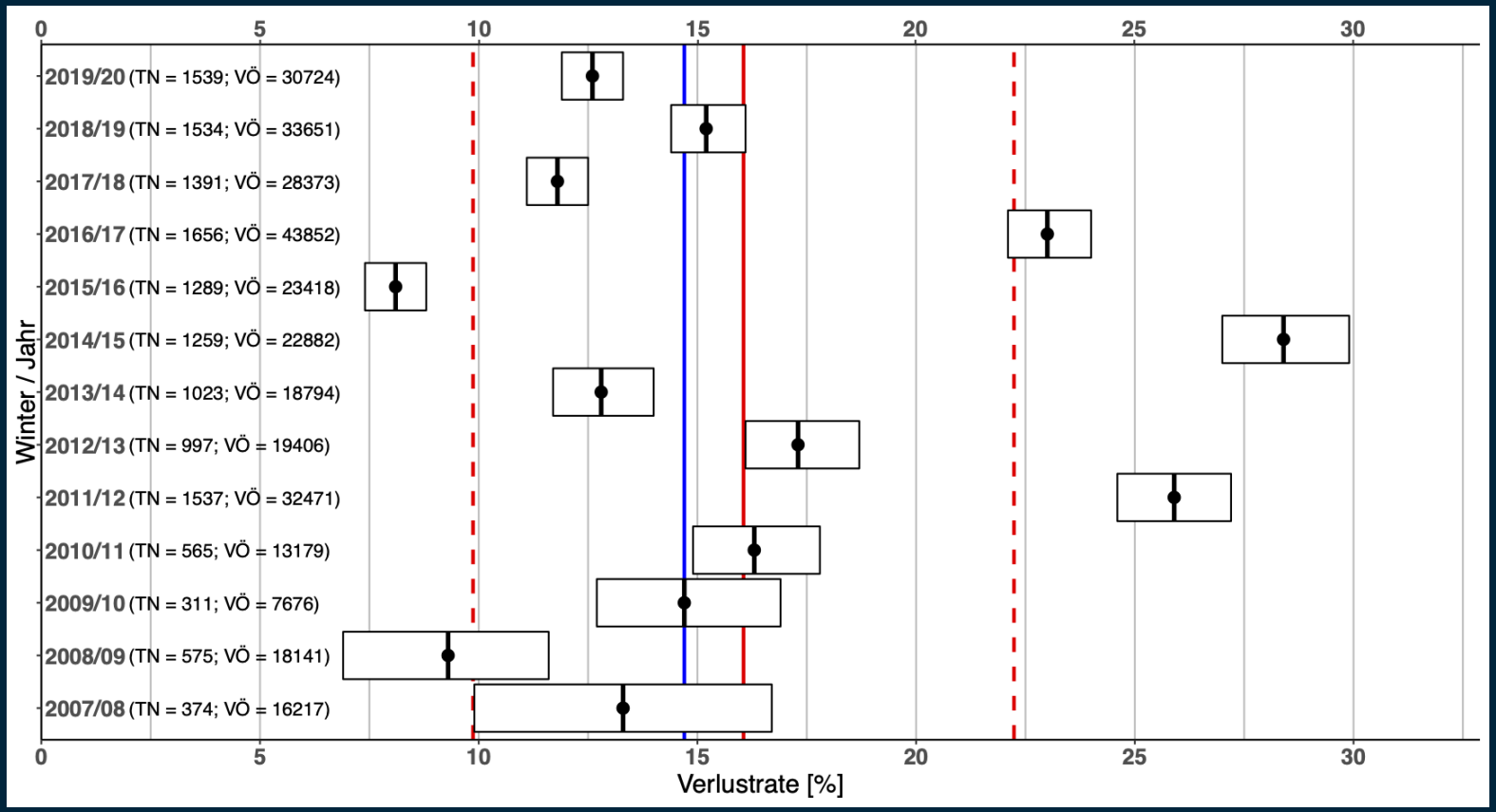
- First investigation of varroa treatment related costs
- Novel description of the economics behind the mite agent sector

Outlook:

- Survey 2020/21
- Cost-benefit analysis including winter loss rate of honeybee colonies
- (Decision Tree Generation)

Appendix

History of Winter Colony Losses in Austria



Red = Running Average + SD, Blue = Median, TN = Participants, VÖ = Colonies

Participants geographical Distribution