

# Report: Hybrid vigor in response to Eimeria in the HMHZ

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## General informations on HMHZ

- 485 mice were captured over three years and had fecal samples processed, from 146 farms.
- From these mice, (*tbc* : *N* had colon content and intestinal tissues collected for PCR and qPCR detection)
- 3.79 mice were caught on average by farm (95% ci : 0.36)
- **Hybrid indexes** were calculated as ratio of M.m.d/M.m.m alleles (between 4 and 14, on average 13 loci)

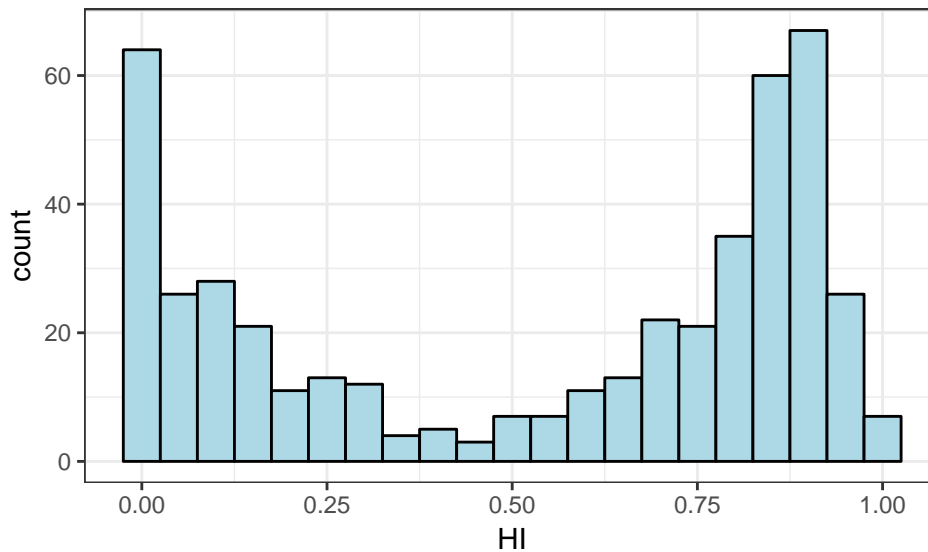


Figure 1: Number of animals caught along the hybrid index

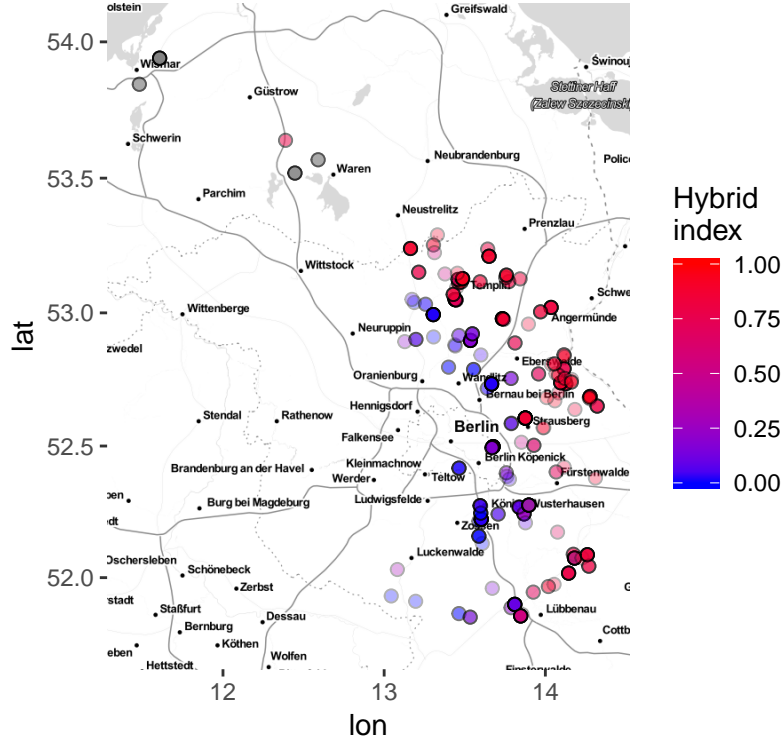


Figure 2: Samples map. Each point correspond to one location, a less pronounced transparency indicating more animals sampled at this location. Hybrid index is represented by a gradient from blue (M.m.d) to red (M.m.m)

The average *Eimeria* prevalence per farm based on oocysts flotation is 15.22. We observed, based on this technique, a variation between years (Table 1).

Table 1: Prevalence of *Eimeria* based on OPG per year

	2015	2016	2017
FALSE	92.0	126	167.00
TRUE	10.0	24	66.00
prevalence(%)	9.8	16	28.33

## Improving *Eimeria* oocysts detection

22 new samples were detected while diluting by 0.1mL PBS instead of 1mL before counting in Neubauer chamber.

Adjusted R-squared = 0.81 represents the amount of variation in y explained by x.

<https://www.r-bloggers.com/correlation-and-linear-regression/> (for Lorenzo)

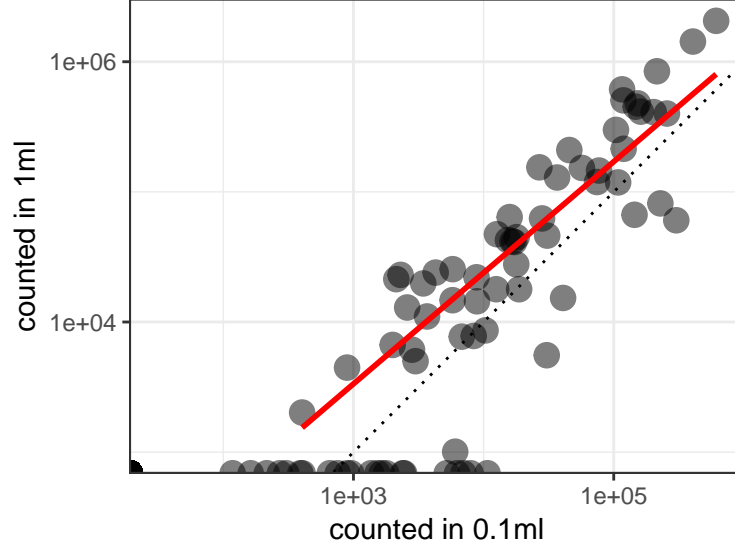


Figure 3: Comparison of OPG depending on dilution level. Red line represents linear relationship between both axis, dotted line represents the function  $y = x$

### Missing data (to complete with Victor)

Some mice do not have an hybrid index yet: SK\_3174, AA\_0411, AA\_0412, AA\_0489, AA\_0490, AA\_0491, AA\_0495, AA\_0496, AA\_0497, AA\_0498, AA\_0499, AA\_0500, AA\_0501, AA\_0502, AA\_0503, AA\_0504, AA\_0505, AA\_0506, AA\_0511, AA\_0512, AA\_0513, AA\_0514, AA\_0515

### PCR

Table 2: Prevalence of Eimeria based on positive AP5 PCR, per year

	2015	2016	2017
negative	90.00	135.0	160.00
positive	12.00	14.0	72.00
prevalence(%)	11.76	9.4	31.03

*PCR.positive* means that AP5 was positive AND another marker gave a sequence

Table 3: Prevalence of Eimeria based on the obtention of a sequence of a marker (COI, 18S or ORF470), per year

	2015	2016	2017
negative	92.0	137.00	174
positive	10.0	12.00	58
prevalence(%)	9.8	8.05	25

## qPCR

Table 4: Prevalence of Eimeria based on positive qPCR, per year

	2015	2016	2017
negative	0	125.00	0
positive	0	19.00	0
prevalence(%)	NaN	13.19	NaN

## Comparison oocysts flotation, PCR, qPCR

*Plot a venn diagram here*

## Testing hybrid vigor along HMHz

### Oocyst shedding proxy

First approximation:

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```

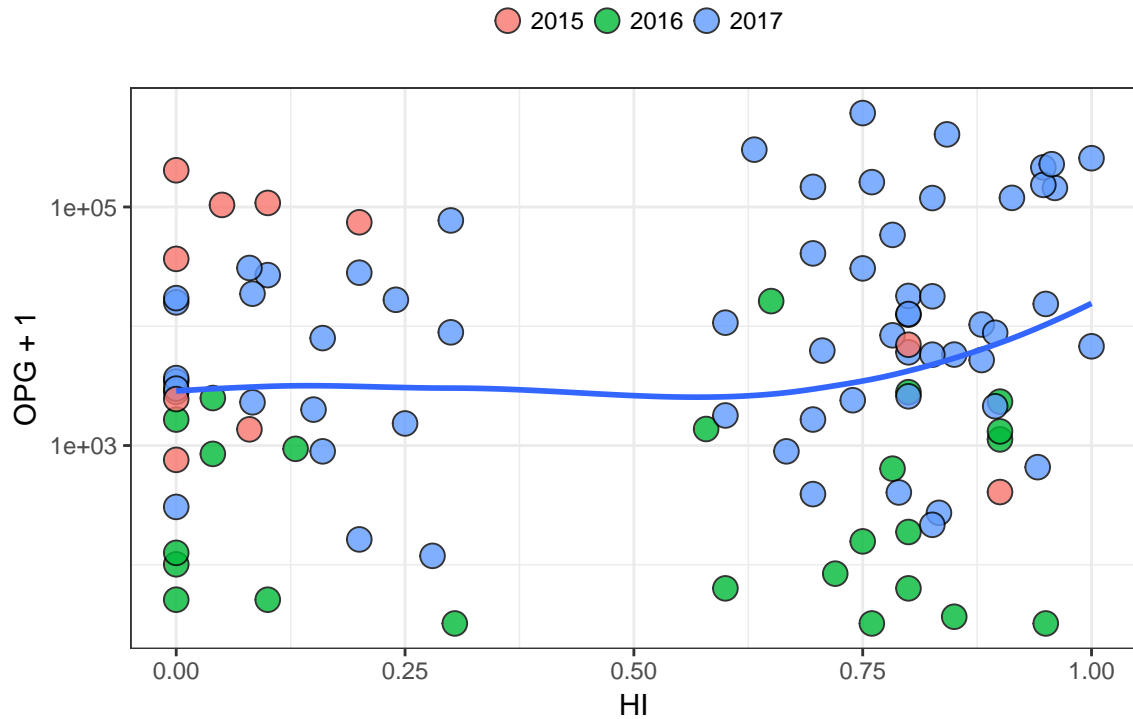


Figure 4: OPG along HI, colored per year. Blue line represent a smooth function (method = loess)

Statistical model (dvp...)

qPCR proxy

tbc

BCI proxy

First approximation:

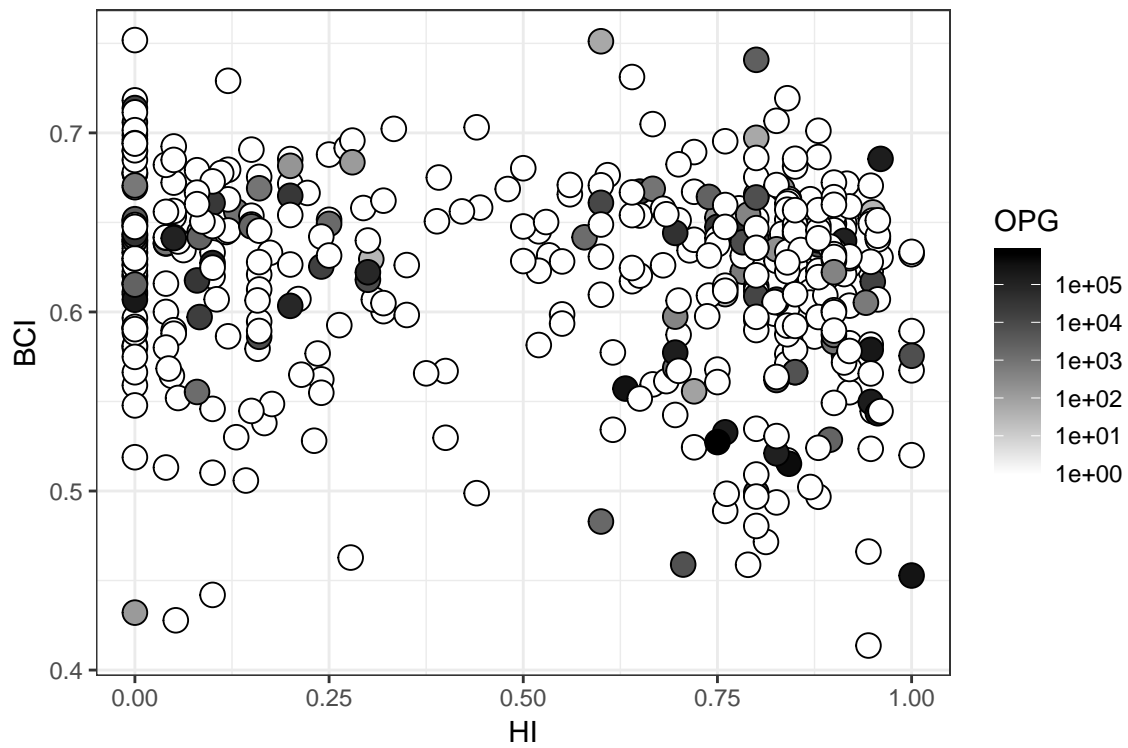


Figure 5: BCI along HI, colored per level of OPG