20250801_abner_emmeans.Rmd

2025-08-01

```
# First, fit your model and store it
model <- glm.nb(
    is.referenced.by.count ~ da_factor + log(age.in.months) + container.title +
        container.title*da_factor + log(age.in.months)*da_factor +
        container.title*log(age.in.months) +
        log(age.in.months) * da_factor * container.title,
    data = my_data,
    link = "log"
)
# Define the age values you want to examine (in months)
age_values <- c(12, 36, 60, 84, 120)  # Adjust these as needed
# Get emmeans on the link scale for all combinations
emm <- emmeans(model,  ~ da_factor + age.in.months | container.title,
        at = list(age.in.months = age_values), CIs = TRUE,
        type = "response")
# Get pairwise comparisons (differences) between da_factor levels
differences <- contrast(
    emm, by = c("age.in.months", "container.title"),
    method = "pairwise",
    ratios = TRUE, CIs = TRUE
)
# See the contrasts
summary(differences)
```

```
## age.in.months = 12, container.title = Antimicrobial Agents and Chemotherapy:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  1.813 0.2050 Inf    1   5.265  <.0001
##
## age.in.months = 36, container.title = Antimicrobial Agents and Chemotherapy:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  1.211 0.0755 Inf    1   3.069  0.0021
##
## age.in.months = 60, container.title = Antimicrobial Agents and Chemotherapy:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  1.004 0.0451 Inf    1   0.081  0.9355
##
## age.in.months = 84, container.title = Antimicrobial Agents and Chemotherapy:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.887 0.0353 Inf    1  -3.017  0.0025
##
## age.in.months = 120, container.title = Antimicrobial Agents and Chemotherapy:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.778 0.0330 Inf    1  -5.925  <.0001
##
```

```
## age.in.months = 12, container.title = Applied and Environmental Microbiology:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  1.159 0.0797 Inf    1   2.150  0.0316
##
## age.in.months = 36, container.title = Applied and Environmental Microbiology:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.933 0.0375 Inf    1  -1.727  0.0842
##
## age.in.months = 60, container.title = Applied and Environmental Microbiology:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.843 0.0247 Inf    1  -5.826  <.0001
##
## age.in.months = 84, container.title = Applied and Environmental Microbiology:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.789 0.0192 Inf    1  -9.723  <.0001
##
## age.in.months = 120, container.title = Applied and Environmental Microbiology:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.735 0.0168 Inf    1 -13.440  <.0001
##
## age.in.months = 12, container.title = Genome Announcements:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.888 0.6270 Inf    1  -0.169  0.8662
##
## age.in.months = 36, container.title = Genome Announcements:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.912 0.3350 Inf    1  -0.251  0.8020
##
## age.in.months = 60, container.title = Genome Announcements:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.924 0.1950 Inf    1  -0.376  0.7068
##
## age.in.months = 84, container.title = Genome Announcements:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.931 0.1060 Inf    1  -0.629  0.5294
##
## age.in.months = 120, container.title = Genome Announcements:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.939 0.0500 Inf    1  -1.175  0.2399
##
## age.in.months = 12, container.title = Infection and Immunity:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  1.110 0.1940 Inf    1   0.599  0.5494
##
## age.in.months = 36, container.title = Infection and Immunity:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.964 0.0999 Inf    1  -0.350  0.7267
##
## age.in.months = 60, container.title = Infection and Immunity:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.903 0.0699 Inf    1  -1.315  0.1883
##
## age.in.months = 84, container.title = Infection and Immunity:
##  contrast  ratio     SE  df null z.ratio p.value
```

```
##  No / Yes  0.865 0.0574 Inf    1  -2.184  0.0289
##
## age.in.months = 120, container.title = Infection and Immunity:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.826 0.0527 Inf    1  -2.989  0.0028
##
## age.in.months = 12, container.title = Journal of Bacteriology:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  1.083 0.1530 Inf    1   0.565  0.5719
##
## age.in.months = 36, container.title = Journal of Bacteriology:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  1.131 0.0945 Inf    1   1.469  0.1419
##
## age.in.months = 60, container.title = Journal of Bacteriology:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  1.153 0.0675 Inf    1   2.438  0.0147
##
## age.in.months = 84, container.title = Journal of Bacteriology:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  1.169 0.0513 Inf    1   3.551  0.0004
##
## age.in.months = 120, container.title = Journal of Bacteriology:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  1.185 0.0388 Inf    1   5.193  <.0001
##
## age.in.months = 12, container.title = Journal of Clinical Microbiology:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  1.075 0.1430 Inf    1   0.549  0.5831
##
## age.in.months = 36, container.title = Journal of Clinical Microbiology:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.812 0.0622 Inf    1  -2.721  0.0065
##
## age.in.months = 60, container.title = Journal of Clinical Microbiology:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.712 0.0399 Inf    1  -6.058  <.0001
##
## age.in.months = 84, container.title = Journal of Clinical Microbiology:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.654 0.0312 Inf    1  -8.916  <.0001
##
## age.in.months = 120, container.title = Journal of Clinical Microbiology:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.597 0.0279 Inf    1 -11.064  <.0001
##
## age.in.months = 12, container.title = Journal of Microbiology &amp;amp; Biology Education:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes nonEst     NA  NA    1      NA      NA
##
## age.in.months = 36, container.title = Journal of Microbiology &amp;amp; Biology Education:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes nonEst     NA  NA    1      NA      NA
##
```

```
## age.in.months = 60, container.title = Journal of Microbiology &amp;amp; Biology Education:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes nonEst     NA  NA    1      NA      NA
##
## age.in.months = 84, container.title = Journal of Microbiology &amp;amp; Biology Education:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes nonEst     NA  NA    1      NA      NA
##
## age.in.months = 120, container.title = Journal of Microbiology &amp;amp; Biology Education:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes nonEst     NA  NA    1      NA      NA
##
## age.in.months = 12, container.title = Journal of Virology:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  1.253 0.1140 Inf    1   2.482  0.0131
##
## age.in.months = 36, container.title = Journal of Virology:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  1.013 0.0513 Inf    1   0.255  0.7988
##
## age.in.months = 60, container.title = Journal of Virology:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.918 0.0344 Inf    1  -2.291  0.0220
##
## age.in.months = 84, container.title = Journal of Virology:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.860 0.0294 Inf    1  -4.425  <.0001
##
## age.in.months = 120, container.title = Journal of Virology:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.802 0.0296 Inf    1  -5.974  <.0001
##
## age.in.months = 12, container.title = mBio:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.976 0.0849 Inf    1  -0.278  0.7813
##
## age.in.months = 36, container.title = mBio:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.825 0.0360 Inf    1  -4.411  <.0001
##
## age.in.months = 60, container.title = mBio:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.763 0.0283 Inf    1  -7.311  <.0001
##
## age.in.months = 84, container.title = mBio:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.724 0.0303 Inf    1  -7.715  <.0001
##
## age.in.months = 120, container.title = mBio:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.686 0.0361 Inf    1  -7.161  <.0001
##
## age.in.months = 12, container.title = Microbiology Resource Announcements:
##  contrast  ratio     SE  df null z.ratio p.value
```

```
##  No / Yes  1.794 0.9710 Inf    1   1.080  0.2800
##
## age.in.months = 36, container.title = Microbiology Resource Announcements:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  1.569 0.3480 Inf    1   2.033  0.0421
##
## age.in.months = 60, container.title = Microbiology Resource Announcements:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  1.474 0.3000 Inf    1   1.910  0.0562
##
## age.in.months = 84, container.title = Microbiology Resource Announcements:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  1.415 0.3820 Inf    1   1.287  0.1981
##
## age.in.months = 120, container.title = Microbiology Resource Announcements:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  1.355 0.5030 Inf    1   0.818  0.4134
##
## age.in.months = 12, container.title = Microbiology Spectrum:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.950 0.0733 Inf    1  -0.664  0.5064
##
## age.in.months = 36, container.title = Microbiology Spectrum:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.751 0.0462 Inf    1  -4.657  <.0001
##
## age.in.months = 60, container.title = Microbiology Spectrum:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.673 0.0702 Inf    1  -3.798  0.0001
##
## age.in.months = 84, container.title = Microbiology Spectrum:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.626 0.0848 Inf    1  -3.456  0.0005
##
## age.in.months = 120, container.title = Microbiology Spectrum:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.580 0.0983 Inf    1  -3.214  0.0013
##
## age.in.months = 12, container.title = mSphere:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.957 0.1510 Inf    1  -0.276  0.7823
##
## age.in.months = 36, container.title = mSphere:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.882 0.0633 Inf    1  -1.753  0.0797
##
## age.in.months = 60, container.title = mSphere:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.849 0.0559 Inf    1  -2.492  0.0127
##
## age.in.months = 84, container.title = mSphere:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.828 0.0677 Inf    1  -2.315  0.0206
##
```

```
## age.in.months = 120, container.title = mSphere:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.806 0.0871 Inf    1  -1.998  0.0458
##
## age.in.months = 12, container.title = mSystems:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  1.124 0.1690 Inf    1   0.773  0.4394
##
## age.in.months = 36, container.title = mSystems:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.897 0.0686 Inf    1  -1.424  0.1546
##
## age.in.months = 60, container.title = mSystems:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.807 0.0708 Inf    1  -2.439  0.0147
##
## age.in.months = 84, container.title = mSystems:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.754 0.0834 Inf    1  -2.556  0.0106
##
## age.in.months = 120, container.title = mSystems:
##  contrast  ratio     SE  df null z.ratio p.value
##  No / Yes  0.700 0.0990 Inf    1  -2.519  0.0118
##
## Tests are performed on the log scale
```

```
# Plot the contrasts
plot(differences, ratios = TRUE)
```

```
## Warning: Removed 5 rows containing missing values or values outside the scale range
## (`geom_point()`).
```

```
## Warning: Removed 5 rows containing missing values or values outside the scale range
## (`geom_segment()`).
```

```
## Warning: Removed 5 rows containing missing values or values outside the scale range
## (`geom_point()`).
```

contrast