Understanding ALFAM2 pH/DM response

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To try to understand DM effects

```
rm(list = ls())
library(ALFAM2)
library(ggplot2)
library(dplyr)
source('../../functions/rounddf.R')
```

Get, tweak pars

```
load('../../parameters/parf.RData')
pars <- parf
pars['man.ph.r1'] <- 0.66
pars['man.ph.r3'] <- 0.24
```

Input data.

```
dat <- data.frame(ct = 168, animal = rep(c('cattle', 'pig'), each = 4),
                  man.source.pig = rep(c(FALSE, TRUE), each = 4),
                  man.dm = c(7.5, 7.5, 3.75, 3.75, 3.5, 3.5, 1.75, 1.75),
                  man.ph = c(7,   6.5, 7,    6.5,  7,   6.5, 7,    6.5),
                  TAN.app = 100)
dat$id <- 1:nrow(dat)
```

Run model.

```
pred <- ALFAM2mod(dat, pars = pars, group = 'id')
```

```
## Warning in ALFAM2mod(dat, pars = pars, group = "id"): Running with 9 parameters. Dropped 15 with no r
## These secondary parameters have been dropped: app.mthd.os.f0, app.rate.nos.f0, app.mthd.bc.r1, air.t
```

```
dat <- merge(dat, pred, by = c('id', 'ct'))
dat <- as.data.frame(mutate(group_by(dat, animal, man.dm), red = 100 * (1 - er / er[man.ph == 7])))
dat <- rounddf(dat, digits = 3, func = signif)
```

Checck.

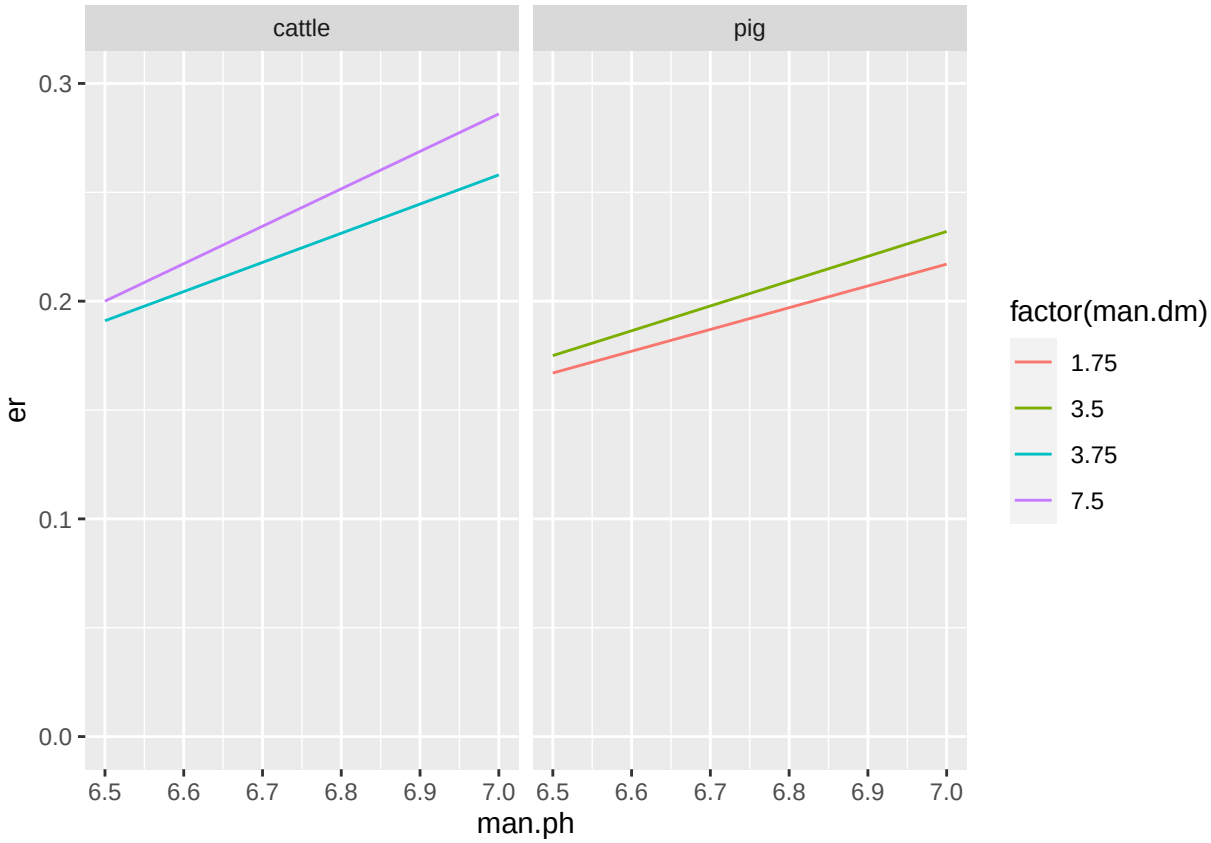
```
dat
```

```
##   id  ct animal man.source.pig man.dm man.ph TAN.app  dt     f0     r1     r2
## 1  1 168 cattle          FALSE   7.50    7.0     100 168 0.4940 0.0261 0.0765
## 2  2 168 cattle          FALSE   7.50    6.5     100 168 0.4940 0.0122 0.0765
## 3  3 168 cattle          FALSE   3.75    7.0     100 168 0.1830 0.0685 0.0765
## 4  4 168 cattle          FALSE   3.75    6.5     100 168 0.1830 0.0321 0.0765
## 5  5 168    pig           TRUE   3.50    7.0     100 168 0.1110 0.0731 0.0765
## 6  6 168    pig           TRUE   3.50    6.5     100 168 0.1110 0.0342 0.0765
## 7  7 168    pig           TRUE   1.75    7.0     100 168 0.0591 0.1150 0.0765
```

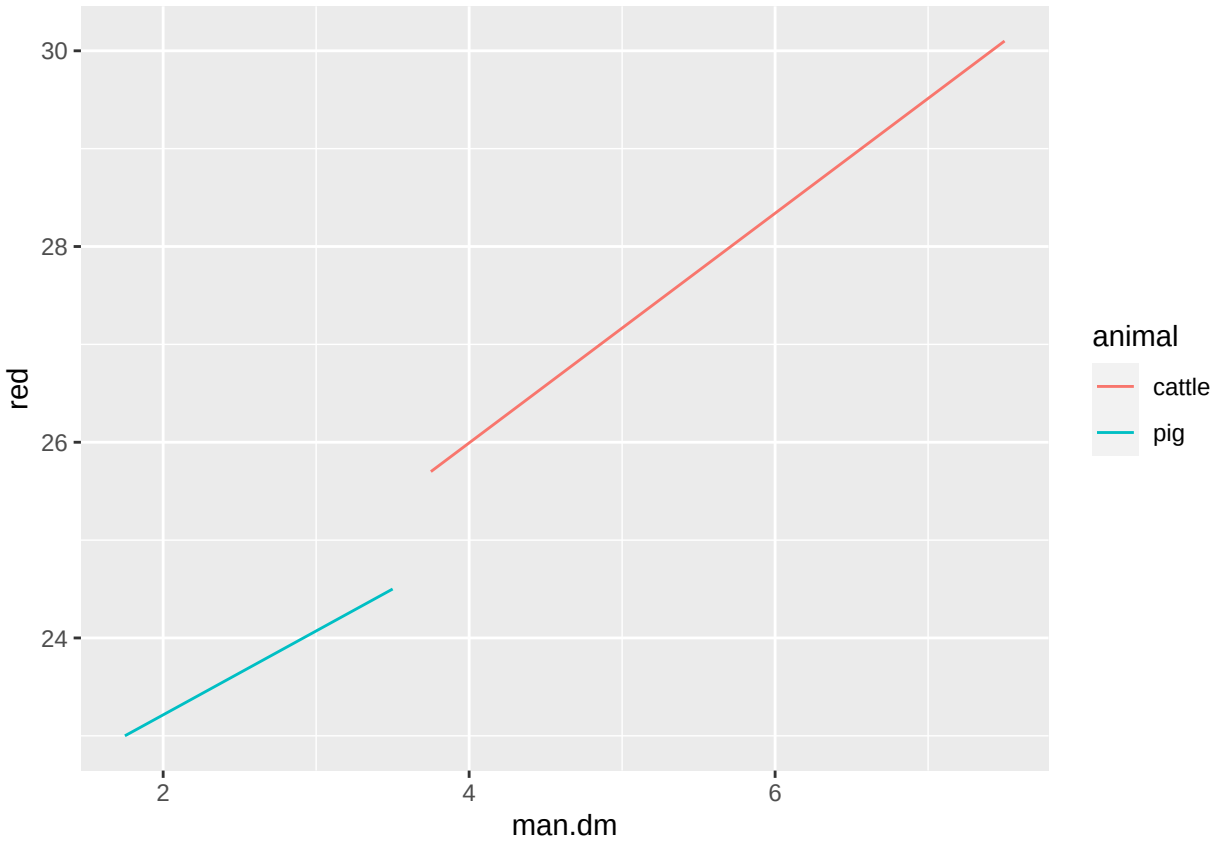
```
## 8  8 168    pig           TRUE   1.75    6.5     100 168 0.0591 0.0537 0.0765
##         r3 f4        f    s      j    e e.int    er  red
## 1 0.001240  1 1.62e-06 71.4 0.1700 28.6  28.6 0.286  0.0
## 2 0.000941  1 1.67e-05 80.0 0.1190 20.0  20.0 0.200 30.1
## 3 0.001240  1 4.79e-10 74.2 0.1530 25.8  25.8 0.258  0.0
## 4 0.000941  1 2.20e-07 80.9 0.1140 19.1  19.1 0.191 25.7
## 5 0.001240  1 1.35e-10 76.8 0.1380 23.2  23.2 0.232  0.0
## 6 0.000941  1 9.30e-08 82.5 0.1040 17.5  17.5 0.175 24.5
## 7 0.001240  1 6.54e-14 78.3 0.1290 21.7  21.7 0.217  0.0
## 8 0.000941  1 1.87e-09 83.3 0.0993 16.7  16.7 0.167 23.0
```

Plot.

```
ggplot(dat, aes(man.ph, er, colour = factor(man.dm))) +
  geom_line() +
  ylim(0, 0.30) +
  facet_wrap(~ animal)
```




```
dd <- subset(dat, red > 0)
ggplot(dd, aes(man.dm, red, colour = animal)) +
  geom_line()
```



Check output similar to curves doc

```
dat <- data.frame(ct = 168, TAN.app = 100)
dat$rain.rate <- 0.06
dat$rain.cum <- dat$rain.rate * dat$ct

pred1u <- ALFAM2mod(dat, pars = pars, man.ph = 7, wind.2m = 3, air.temp = 13)
```

```
## Warning in ALFAM2mod(dat, pars = pars, man.ph = 7, wind.2m = 3, air.temp = 13): Running with 11 paran
## These secondary parameters have been dropped: app.mthd.os.f0, app.rate.nos.f0, man.dm.f0, app.mthd.b
```

```
pred1a <- ALFAM2mod(dat, pars = pars, man.ph = 6.6, wind.2m = 3, air.temp = 13)
```

```
## Warning in ALFAM2mod(dat, pars = pars, man.ph = 6.6, wind.2m = 3, air.temp = 13): Running with 11 par
## These secondary parameters have been dropped: app.mthd.os.f0, app.rate.nos.f0, man.dm.f0, app.mthd.b
```

```
pred2u <- ALFAM2mod(dat, pars = pars, man.ph = 7, wind.2m = 7, air.temp = 20)
```

```
## Warning in ALFAM2mod(dat, pars = pars, man.ph = 7, wind.2m = 7, air.temp = 20): Running with 11 paran
## These secondary parameters have been dropped: app.mthd.os.f0, app.rate.nos.f0, man.dm.f0, app.mthd.b
```

```
pred2a <- ALFAM2mod(dat, pars = pars, man.ph = 6.6, wind.2m = 7, air.temp = 20)
```

```
## Warning in ALFAM2mod(dat, pars = pars, man.ph = 6.6, wind.2m = 7, air.temp = 20): Running with 11 par
## These secondary parameters have been dropped: app.mthd.os.f0, app.rate.nos.f0, man.dm.f0, app.mthd.b
```

```
pred1u
```

```
##    ct  dt        f0        r1        r2          r3 f4           f       s
```

```
## 1 168 168 0.3511408 0.04245388 0.08119782 0.0009393761  1 3.339422e-08 75.2557
##           j       e   e.int       er
## 1 0.1472875 24.7443 24.7443 0.247443
```

```
pred1a
```

```
##    ct  dt        f0         r1         r2           r3 f4            f        s
## 1 168 168 0.3511408 0.02311625 0.08119782 0.0007530773  1 8.601479e-07 81.43443
##           j        e    e.int        er
## 1 0.1105093 18.56556 18.56556 0.1856556
```

```
pred2u
```

```
##    ct  dt        f0        r1         r2          r3 f4            f        s
## 1 168 168 0.3511408 0.6211942 0.08119782 0.001084816  1 1.985761e-50 57.46371
##           j        e    e.int        er
## 1 0.2531922 42.53629 42.53629 0.4253629
```

```
pred2a
```

```
##    ct  dt        f0        r1         r2          r3 f4            f        s
## 1 168 168 0.3511408 0.3382419 0.08119782 0.000869673  1 8.760792e-30 61.95157
##           j        e    e.int        er
## 1 0.2264788 38.04843 38.04843 0.3804843
```