Cal_Clean: A Script for Tidying Sable Indirect Calorimetry Data

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Inputs:

- Cohort and rundate of calorimetry run
- List of animal ID numbers to be excluded (NA if none)

Outputs:

- .Rda file containing cleaned dataframe at original sampling rate (typically, 1-3 minutes), 1h-binned dataframe, and photoperiod-binned dataframes for further plotting and statistical analyses.

Requirements:

- .exp data files processed with MI v2.46 in 1-minute bins
- TimeSeries sheet as a .csv saved in your default working directory (run `library(here)` to find out where this is!)
- Group decoding sheet with same prefix as TimeSeries sheet (e.g., expID_date_code.csv), saved in same directory

Known bugs:

- EnviroLightlux_M is inconsistent in numbering (sometimes has 0s and 1s, or 1s and 3s, or 3s and 7s), therefore photoperiod assignment is done based on ZT/clock time and NOT from sensor. This will need to be updated for DD or other light schedule experiments

Load required packages

```
library(plyr, include.only = 'mapvalues')
library(tidyverse)
library(magrittr)
library(lubridate)
library(here)
```

Define inputs to script for analysis

If everything is working properly, these variables are the only ones a user should have to change to clean a given file's calorimetry data. Eventually, this entire script will be converted to a function, such that the user would type these in-line when calling that function (e.g., `Cal_Clean(cohort = 'mon001',rundate = '2021-10-18',remove_animals = 274,trim.short.days = FALSE)`).

```
# Run-specific user-defined parameters
cohort          <- "mon001"
rundate         <- "2021-10-18"
remove_animals  <- 274

# Default parameters
trim.short.days <- FALSE
diet.kcal       <- 4.2
cols2excl       <- c('Age','Cage','Stilltime_M',
                'Sleeptime_M','XBreak_R','YBreak_R',
                'Mass_g','AllMeters_M')
ext             <- ".csv"
```

Load data

To load your data, please ensure that it is located in the repository that the `here()` function points to. Otherwise, you will get an error.

A workaround, if you do not wish to load your data using the here() package, is to type the entire file path in the call to `read_csv()`.

```
filename        <- paste(rundate,cohort,sep = "_")
code            <- paste(rundate,cohort,"DECODED",sep = "_")
```

```
# Load csv with run metadata
df_code          <- read_csv(here::here(paste(code,".csv",sep = "")))
df_code
```

Animal	Mass_g	Sex	Age	ID_Code	Group	Cohort	Treatment	Diet
1	9.40	M	NA	271	mHFD	1	HIchABC	NA
2	9.30	M	NA	272	mHFD	1	HIchABC	NA
3	9.25	F	NA	273	mHFD	1	HIchABC	NA
4	8.60	F	NA	274	mHFD	1	HIchABC	NA
5	9.30	M	NA	275	mHFD	1	HIchABC	NA
6	7.60	F	NA	276	mHFD	1	HIchABC	NA
9	9.65	M	NA	264	mHFD	1	chABC	NA
10	10.00	M	NA	265	mHFD	1	chABC	NA
11	8.75	F	NA	266	mHFD	1	chABC	NA
12	8.85	F	NA	267	mHFD	1	chABC	NA
13	9.70	M	NA	268	mHFD	1	chABC	NA
14	9.80	F	NA	269	mHFD	1	chABC	NA
15	9.30	F	NA	270	mHFD	1	chABC	NA

```
# Load cal.csv and merge metadata
df               <- read_csv(here::here(paste(filename,".csv",sep = ""))) %>%
  left_join(df_code, by = "Animal") %>%                  #unblind by merging with decoding
  mutate(across(.cols = everything()),na_if(.,".")) %>% #replace "." with "NA"
  rename(Cage = Animal)%>%
  select(!(starts_with("Enviro")
           | starts_with("Ped")
           | all_of(cols2excl)))
head(df)
```

DateTime	VO2_ml	VCO2_ml	VH2O_ml	kcal_hr	RER	Flow	ModInterval	WaterMeter	BodyMass_g	MassMeasurement	ID_Code	Group	Cohort	Treatment	Diet
2021/10/18 12:47:24	1859947.14	1755296.0003892	-	0.17463	0.94	2677977	0	10.5999	24023091	2	271	mHFD	1	HIchABC	NA
2021/10/18 12:50:24	1857792.63	1815539.0038660	-	0.16993	0.98	6855576	0	10.5999	24000000	0	271	mHFD	1	HIchABC	NA
2021/10/18 12:53:24	1850856.64	1798845.0034946	-	0.15010	0.88	5183202	0	10.5999	24018091	2	271	mHFD	1	HIchABC	NA
2021/10/18 12:56:24	1857612.24	1856522.9567268	45.58	449407	0	10.5999	24013535	5	271	mHFD	1	HIchABC	NA		

DateTime	VO2_MVCO2VH2Okcal_hrRER_FoodInWater_M		BodyMass_AllMeters_M	Sex_ID_Code	Group	Cohort	Treatment	Diet
2021/10/18 12:59:24	0.854690.1158492534000411597482390021	0	10.59924018090M2	271	mHFD	1	HIchABC	NC
2021/10/18 13:02:24	0.8539704345350170036871577231405672	0	10.59924008535M5	271	mHFD	1	HIchABC	NC

Tidy data

Here, we remove any animals that we had previously specified, and perform some general data cleaning - most importantly, extraction of time of day information from the DateTime column.

```
# Remove dead/sick animals
df %<>%
  filter(ID_Code != remove_animals)

# Parse date-times and sort by animal ID (ID_Code) and date-time
df %<>%
  relocate(c(DateTime,Sex,Group,Treatment,Cohort,ID_Code)) %>%
  mutate(DateTime = round_date(ymd_hms(df$DateTime),unit = "minute")) %>%
  mutate(month = as.numeric(month(DateTime)),
         day = as.numeric(day(DateTime)),
         hour = as.numeric(hour(DateTime)),
         minute = as.numeric(minute(DateTime)))

df <- df[order(df$DateTime),] %>%
  arrange(ID_Code)

head(df)
```

DateTime	Sex	Group	TreatmentCohort	ID_Code	VO2_MVCO2_MH2O_kcal_hr_RER_MFoodIn_M	WaterIn_M	BodyMass_AllMeters_Diet	month	day	hour	minute
2021-10-18 12:47:00	M	mHFD	chABC 1	264	0.79702957108689 0.231072816080 02 -0.0161321	0	12.82739655NA 2	10	18	12	47
2021-10-18 12:50:00	M	mHFD	chABC 1	264	0.87253749270349285045714883	0	12.82739619NA 8	10	18	12	50

DateTime	Sex	Group	Treatment	Cohort	ID_Code	VO2_M	VCO2_M	VH2O_M	kcal_hr_M	RER_M	FoodInA_M	WaterInA_M	BodyMass_M	AllMeters_R	month	day	hour	minute
2021-10-18 12:53:00	M	mHFD	chABC	1	264	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]	10	18	12	53
2021-10-18 12:56:00	M	mHFD	chABC	1	264	[illegible]	[illegible]	0.0029723	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]	10	18	12	56
2021-10-18 12:59:00	M	mHFD	chABC	1	264	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]	10	18	12	59
2021-10-18 13:02:00	M	mHFD	chABC	1	264	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]	10	18	13	2

Transform data

Here, we compute a handful of new variables from existing ones, including Zeitgeber time, Photoperiod, and experimental day from DateTime, etc.

```
# Compute experimental day and ZT time, rename some variables
df %<>%
  mutate(ZT = plyr::mapvalues(hour, from = (0:23), to = c(18:23,0:17)),.before = Sex) %>%
  mutate(Photoperiod = as.factor(plyr::mapvalues(ZT, from = c(0:23), to = c(rep(1,12),rep(
  mutate(exp_day = plyr::mapvalues(day, from = unique(day), to = 1:length(unique(day))),.a
  rename(VO2 = VO2_M,
         Animal = ID_Code,
         VCO2 = VCO2_M,
         EE = kcal_hr_M,
         RER = RER_M,
         FoodIn.cum = FoodInA_M,
         WaterIn.cum = WaterInA_M,
         AllMeters = AllMeters_R,
         BodyMass = BodyMass_M,
         VH2O = VH2O_M)
```

For plotting purposes, here we create a new column containing the time from which the recording started, in hours.

```
# Compute hours from recording start for plots
start_time <- df$DateTime[1]
df %<>%
  mutate(Time = as.numeric(difftime(DateTime,start_time),units = "hours"),.after = DateTim

head(df$Time)
```

```
[1] 0.00 0.05 0.10 0.15 0.20 0.25
```

Next, we will compute some more parameters of interest, including binned food and water intake (from the original cumulative values), food intake in kcal (from grams), binned and cumulative energy expenditure (from the instantaneous estimate of hourly rate), cumulative distance traveled, and energy balance. The binned energy expenditure is questionable currently - please let me know if you find any issues.

```
# Compute time interval (in hours) for estimating binned energy expenditure
int <- df$Time[2] - df$Time[1]

# Compute new columns
df %<>%
  group_by(Animal) %>%
  mutate(FoodIn.g = c(diff(FoodIn.cum),0),.before = FoodIn.cum) %>% # convert cumulative t
  mutate(FoodIn.cum.kcal = FoodIn.cum *diet.kcal,.after = FoodIn.cum) %>%
  mutate(WaterIn.g = c(diff(WaterIn.cum),0),.before = WaterIn.cum) %>% # convert cumulativ
  mutate(FoodIn.kcal = FoodIn.g * diet.kcal, .before = FoodIn.g) %>% # convert g to kcal
  mutate(EE.kcal.bin = EE * int, .before = EE) %>% # EE is kcal/hr, multiply by int (x hou
  mutate(EE.cum = cumsum(EE.kcal.bin), .before = EE.kcal.bin) %>%
  mutate(EBalance = FoodIn.kcal - EE.kcal.bin, .before = VO2) %>% # compute energy balance
  mutate(EB.cum = cumsum(EBalance), .after = EBalance) %>%
  mutate(AllMeters.cum = cumsum(AllMeters),.before = AllMeters) %>% # compute cumulative d
  ungroup()
```

Next, we remove rows/columns with missing values (NAs) across entire row/column.

```
# Remove any rows/columns with only NAs
df <- df[rowSums(is.na(df)) != ncol(df), ]
df <- df[, colSums(is.na(df)) != nrow(df)]
```

Here we can optionally remove data points that are not part of a full day's recording. I only recommend this if your first and last days of recording are not important to your analysis.

By default, this will not run. If you want to trim the incomplete days, run `trim.short.days <- TRUE` (default is `FALSE`).

```
# Remove days with <24h
if (trim.short.days) {
  trim.df <- df %>%
  group_by(exp_day) %>%
  mutate(n = n()) %>%
  ungroup() %>%
  filter(!(n < max(n)))
}
```

Bin to hourly

Here, we compute hourly bins for each variable. Depending on variable, this is done by either summing all values within the hour (`cols2sum`: binned, non-cumulative measures), taking the mean of all values within the hour (`cols2avg`: rates), taking the maximum value within the hour (`cols4cum`: binned, cumulative measures), and taking the median value for assigning the new bin time (`cols2keep`: dates and times only).

```
cols2sum <- c('FoodIn.g','FoodIn.kcal','WaterIn.g','EBalance','AllMeters')
cols2avg <- c('VO2','VCO2','VH2O','EE','RER','BodyMass')
cols4cum <- c('AllMeters.cum','FoodIn.cum','WaterIn.cum','EE.cum','EB.cum','FoodIn.cum.kca
cols2keep <- c('DateTime','Time','minute')

df.hourly <- df %>%
  group_by(Animal,exp_day,hour) %>%
  select(!EE.kcal.bin) %>% # don't need the 1-3" bin anymore
  mutate(
    across(all_of(cols2keep),median)) %>% # assign middle of time bin to new bin
  mutate(across(
    all_of(cols2avg), mean)) %>% # rates get averaged
  mutate(across(
    all_of(cols2sum),sum)) %>% # intake, distances get summed
  mutate(across(
    all_of(cols4cum),max)) %>% # cumulative values just keep the maximum (total for the ho
  ungroup() %>%
  distinct() %>% # squashes down to one observation per hour
  select(!c(hour,minute,month,day)) %>%
  mutate(Animal = as.factor(Animal)) %>%
  group_by(Animal) %>%
```

```
  slice(2:(n()-1)) %>% # trim incomplete hours at start and end
  mutate(Time = as.numeric(
    difftime(DateTime,DateTime[1]),units = "hours"),.after = DateTime) %>% # starts clock
  ungroup()
```

Photoperiod and daily means

Next, we compute the cumulative totals or averages of all variables for each experimental day.

Note that the experimental day is derived from the calendar day.

If incomplete days were not trimmed above, then the daily and photoperiod averages will be affected by the start and end of recording where <24-hours are included. Working on a fix for this, where each day starts from the start of the recording (day 1 = first 24 hours, and so on).

```
# Compute average for each day
total.avg.daily <- df %>%
  group_by(exp_day,Group,Treatment,Sex,Animal) %>%
  summarize(
    across(all_of(cols2sum),sum),
    across(all_of(cols2avg),mean)) %>%
  mutate(Photoperiod = "Total") %>%
  ungroup()

total.avg.daily
```

exp_day	Group	Treatment	Sex	Animal	FoodIn	FoodIn[illegible]	WaterIn	EBalance	AllMeters	VO2	VCO2	VH2O	EE	RER	BodyMass	Photoperiod
1	mHFD	chABC	F	266	[illegible]	[illegible]	[illegible]	-0.6264031	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total
1	mHFD	chABC	F	267	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total
1	mHFD	chABC	F	269	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total
1	mHFD	chABC	F	270	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total
1	mHFD	chABC	M	264	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total
1	mHFD	chABC	M	265	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total
1	mHFD	chABC	M	268	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total
1	[illegible]	[illegible]	F	273	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total
1	[illegible]	[illegible]	F	276	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total
1	[illegible]	[illegible]	M	271	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total
1	[illegible]	[illegible]	M	272	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total

exp_	Gro	Treatment	Sex	Animal	FoodIn	FoodIn	WaterIn	EB	Ambulatory	VO2	VCO2	VH2O	EE	RER	BodyMass	Phase	period
1	mHFD	ChAB	C	275	1.91	3	4	0	3	6	0	2	9	4	1	2	5	8	0	7	7	7	5	1	6	1	5	8	2	0	4	3	7	2	9	7	0	7	5	2	4	8	1	6	2	4	2	2	8	8	3	5	5	4	9	1	2	7	5	1	2	Total
2	mHFD	DAB	C	266	3.33	5	7	4	7	0	1	0	2	1	2	3	3	6	4	8	8	9	9	7	3	6	4	1	5	5	1	0	8	8	9	0	6	1	6	8	8	5	5	2	5	9	9	1	6	8	0	1	2	4	2	9	7	3	3	1	6	Total
2	mHFD	DAB	C	267	2.49	6	6	4	8	5	9	5	5	7	5	8	7	4	3	7	3	9	7	2	4	8	0	5	6	6	6	8	1	2	2	8	3	8	9	8	8	0	0	6	6	8	6	8	9	2	0	0	0	9	3	7	7	5	2	8	Total
2	mHFD	DAB	C	269	2.12	0	5	8	9	0	0	6	4	8	6	3	5	6	4	1	4	7	5	3	3	6	8	5	9	7	5	7	6	6	1	8	1	6	5	9	2	8	8	7	8	6	3	2	2	5	8	7	8	9	8	2	6	6	4	7	9	8	Total
2	mHFD	DAB	C	270	3.23	7	8	3	9	5	9	8	3	2	4	1	1	3	6	0	2	9	2	4	0	6	3	2	3	2	3	7	5	7	6	1	9	4	4	6	7	7	8	0	5	8	4	2	7	7	8	6	9	5	1	2	7	9	7	6	5	8	Total
2	mHFD	DAB	C	264	3.59	9	9	2	5	0	1	9	7	0	4	2	2	5	4	6	6	8	4	2	3	5	4	5	4	2	9	7	6	0	4	7	8	8	0	0	5	1	8	7	0	1	1	8	8	9	8	1	8	9	3	1	1	4	0	3	3	0	Total
2	mHFD	DAB	C	265	3.97	9	0	7	6	7	1	2	1	1	5	9	6	6	2	5	2	6	4	7	7	3	6	9	7	8	6	3	1	6	2	5	7	6	6	3	3	4	2	4	9	0	8	5	2	6	8	8	9	3	7	2	3	0	4	2	6	1	Total
2	mHFD	DAB	C	268	4.25	9	8	6	7	4	8	9	1	2	2	4	9	5	1	2	7	0	8	5	6	4	8	9	1	7	9	8	0	3	5	9	3	9	9	1	7	1	9	1	0	5	2	3	7	7	4	8	8	7	4	1	0	0	4	6	0	1	Total
2	mHFD	ChAB	C	273	3.24	8	9	7	6	4	1	6	7	1	6	7	2	0	1	5	5	7	4	7	8	7	3	7	7	3	8	8	1	7	5	2	0	2	7	4	8	4	8	6	2	9	3	7	5	9	6	0	5	8	4	8	1	8	3	Total
2	mHFD	ChAB	C	276	3.56	3	2	0	9	6	5	2	6	0	6	6	8	8	7	6	2	2	7	4	8	8	4	5	5	9	2	1	4	7	6	0	8	3	2	7	9	6	4	6	2	8	6	8	0	3	8	9	1	7	8	6	5	0	5	0	1	Total
2	mHFD	ChAB	C	271	3.18	7	8	0	6	3	8	9	2	3	8	5	4	7	8	7	7	4	7	7	8	9	3	6	6	8	2	0	5	3	7	2	7	4	3	9	8	3	0	2	4	0	4	2	4	3	3	9	9	0	0	5	4	1	8	1	6	0	Total
2	mHFD	ChAB	C	272	4.34	4	6	8	1	0	2	4	7	3	7	2	6	8	5	5	3	4	6	3	1	2	4	0	6	3	1	5	7	1	3	8	6	2	1	7	4	7	3	0	5	0	1	2	9	3	5	9	0	4	2	2	6	0	7	9	3	5	Total
2	mHFD	ChAB	C	275	3.16	6	3	1	3	6	2	9	8	5	4	2	7	6	7	2	8	2	7	1	5	5	6	4	6	1	8	8	7	5	1	7	7	9	3	1	6	9	7	0	7	8	5	7	1	0	4	8	5	1	2	3	1	7	9	4	0	5	Total
3	mHFD	DAB	C	266	3.39	2	6	1	4	5	2	4	8	9	1	8	7	4	4	3	8	4	4	1	0	2	4	5	1	5	0	6	1	0	2	2	5	7	6	8	9	3	6	0	4	8	2	1	0	4	3	2	5	3	3	9	7	8	9	3	0	7	Total
3	mHFD	DAB	C	267	1.23	7	2	3	8	9	6	3	5	8	5	2	1	8	9	4	9	6	3	2	8	5	1	1	5	2	4	4	6	6	0	0	2	8	1	2	9	9	7	0	5	9	8	6	4	7	9	7	2	1	9	3	8	0	1	6	3	8	Total
3	mHFD	DAB	C	269	2.51	0	9	1	0	5	4	5	8	6	3	6	6	1	4	8	7	9	7	6	1	0	9	2	9	9	2	8	0	6	2	1	9	7	3	6	4	5	0	1	0	3	1	8	4	2	3	9	5	0	9	5	7	9	2	6	8	2	Total
3	mHFD	DAB	C	270	3.81	9	1	7	9	0	4	0	5	5	2	2	4	4	8	2	3	0	7	9	8	8	6	2	6	3	5	8	3	6	7	9	6	7	4	7	3	7	4	4	9	3	2	1	7	7	3	9	5	7	0	8	6	8	2	0	7	5	8	Total
3	mHFD	DAB	C	264	2.77	6	9	1	3	6	6	3	1	7	8	6	7	3	4	9	2	3	6	7	1	5	6	4	0	5	0	8	1	3	2	9	3	2	5	4	7	1	7	8	9	9	3	9	4	9	2	6	9	4	4	2	8	1	3	8	6	0	Total
3	mHFD	DAB	C	265	4.68	2	7	9	0	6	6	7	4	6	2	8	8	5	1	0	2	0	3	6	3	3	7	8	7	9	9	0	6	9	3	8	9	2	6	8	8	4	4	2	3	1	2	6	9	3	2	0	8	6	4	6	7	6	2	9	4	7	0	Total
3	mHFD	DAB	C	268	3.36	0	2	4	4	1	0	1	3	0	2	1	6	8	4	4	7	6	6	7	0	2	6	8	5	7	9	3	7	8	7	3	2	9	5	1	1	4	2	8	9	1	2	8	3	1	7	8	9	0	7	4	1	0	2	8	5	0	5	7	Total
3	mHFD	ChAB	C	273	3.59	0	0	8	7	8	3	7	4	9	0	1	5	0	9	3	6	5	2	9	5	3	7	7	6	7	2	2	7	9	6	3	7	7	5	9	2	3	2	7	2	8	2	9	2	2	4	7	7	4	8	4	8	9	3	1	Total
3	mHFD	ChAB	C	276	3.04	1	2	7	7	3	4	2	7	3	8	4	4	8	7	7	7	0	4	6	1	2	9	4	2	7	8	4	1	5	5	3	9	7	9	6	3	7	2	6	4	3	9	8	9	8	5	3	9	4	1	2	5	4	7	7	1	6	Total
3	mHFD	ChAB	C	271	4.05	4	7	7	3	0	2	9	7	4	9	5	0	1	7	8	0	8	2	1	4	7	1	2	6	3	7	6	8	7	9	3	6	8	1	0	0	3	7	6	0	5	7	3	8	2	5	8	6	8	2	6	5	5	1	6	7	2	Total
3	mHFD	DAB	C	272	4.40	0	5	8	4	8	2	3	2	7	7	5	9	8	6	4	6	5	3	6	3	9	8	1	9	5	7	2	3	8	9	7	6	4	1	8	9	7	4	4	8	2	7	0	9	0	3	9	9	1	6	5	2	0	5	6	9	2	Total
3	mHFD	ChAB	C	275	2.98	4	6	8	2	0	3	5	4	5	7	7	9	7	0	5	6	6	8	1	2	2	2	1	8	7	6	6	5	4	8	6	8	7	3	0	6	1	9	6	0	2	8	6	1	9	8	9	2	0	9	7	8	9	7	6	9	Total
4	mHFD	DAB	C	266	4.73	0	9	1	9	8	6	9	8	6	0	7	9	4	4	5	9	0	0	0	2	5	9	9	8	9	2	1	9	8	3	5	0	8	9	0	0	0	5	2	9	3	8	8	6	6	2	0	6	6	0	7	6	0	1	5	8	3	2	5	7	5	Total
4	mHFD	DAB	C	267	2.61	3	8	8	9	0	7	8	3	3	5	7	0	8	3	3	8	9	5	1	5	7	4	3	4	5	7	8	7	1	0	4	2	7	5	4	5	4	1	6	2	6	0	8	2	0	3	9	6	1	7	7	1	4	0	9	7	5	4	Total
4	mHFD	DAB	C	269	3.02	1	4	1	2	8	6	8	9	5	6	3	7	6	1	4	7	3	1	1	0	3	2	4	6	8	4	6	8	7	8	8	8	7	7	6	5	1	1	6	6	9	2	5	9	0	3	9	2	5	0	4	5	2	8	3	9	6	1	Total
4	mHFD	DAB	C	270	3.54	0	5	9	9	8	7	0	2	1	6	5	9	5	3	6	6	0	6	1	3	7	4	0	6	7	7	4	8	7	9	1	7	5	8	7	4	9	9	8	3	3	7	4	6	9	2	4	3	2	4	5	4	6	2	0	5	Total
4	mHFD	DAB	C	264	3.69	0	6	8	5	0	0	1	8	1	1	0	8	6	0	8	2	3	0	1	9	1	0	4	0	4	3	9	3	0	2	6	2	4	2	7	0	4	5	7	3	7	8	7	9	1	9	0	6	2	0	7	6	1	7	3	3	8	Total
4	mHFD	DAB	C	265	4.29	8	4	0	0	5	5	1	2	8	2	8	9	6	1	9	0	4	3	6	7	5	1	5	9	1	7	6	9	3	5	8	6	5	5	1	2	5	5	4	1	2	8	7	9	7	7	0	4	7	3	4	5	1	8	4	6	5	Total
4	mHFD	DAB	C	268	3.74	9	2	5	3	7	4	6	3	6	3	5	3	7	2	3	0	9	4	0	4	7	1	1	0	9	7	5	7	7	8	8	4	4	7	6	0	3	9	2	8	8	2	2	7	8	9	0	0	3	7	8	5	3	6	4	2	Total
4	mHFD	ChAB	C	273	3.67	7	3	2	6	4	4	4	7	6	9	2	5	7	9	7	0	7	5	0	9	8	9	2	3	1	9	6	7	6	6	2	2	0	8	6	4	2	8	2	4	4	5	6	9	0	7	1	3	6	5	1	0	2	2	8	Total
4	mHFD	ChAB	C	276	3.54	3	5	4	6	8	8	2	8	9	3	1	5	3	6	0	4	2	1	1	7	7	6	0	4	9	7	8	5	8	5	4	9	8	4	7	6	8	6	2	8	0	8	6	5	9	5	6	5	9	4	3	2	1	1	4	3	6	Total
4	mHFD	ChAB	C	271	3.70	2	6	7	5	5	0	4	4	7	3	8	1	0	7	4	2	2	7	0	8	3	9	4	2	8	7	8	7	4	4	8	9	4	0	4	0	2	8	0	9	7	9	2	3	3	8	4	1	2	3	4	2	9	8	Total
4	mHFD	DAB	C	272	3.50	5	5	8	4	0	7	2	3	3	6	5	0	1	9	3	1	0	6	2	5	0	5	8	3	5	7	3	8	4	7	4	7	2	4	4	1	4	7	2	2	8	3	3	6	3	9	7	2	0	1	4	4	7	3	1	2	Total
4	mHFD	ChAB	C	275	3.36	5	0	5	3	3	2	4	2	5	1	0	7	0	0	9	0	5	1	2	9	5	8	5	1	5	6	9	7	0	1	8	9	0	5	4	1	6	8	4	3	3	1	2	0	3	4	4	8	7	0	2	0	9	1	7	7	0	Total
5	mHFD	DAB	C	266	1.71	7	3	0	1	5	2	6	7	7	9	1	4	6	7	3	1	2	9	8	0	9	7	7	5	6	8	8	4	0	7	1	6	2	7	1	8	8	4	0	3	9	2	6	3	8	4	5	7	8	0	8	2	4	4	8	Total
5	mHFD	DAB	C	267	2.51	6	2	8	6	6	8	0	0	4	4	6	4	9	8	5	5	7	6	7	8	2	7	4	4	6	8	6	7	9	9	2	6	3	5	6	9	2	2	5	3	5	9	7	4	7	2	2	8	3	0	4	4	8	9	Total
5	mHFD	DAB	C	269	1.49	9	5	2	8	9	8	0	1	8	4	4	1	0	4	9	6	5	9	8	7	5	1	4	5	9	1	1	9	5	8	1	4	4	8	6	4	2	2	3	8	9	6	9	1	8	4	4	8	3	9	4	7	6	3	9	Total
5	mHFD	DAB	C	270	2.18	6	3	0	0	8	2	4	6	0	9	0	8	4	7	3	6	2	8	7	0	4	7	5	9	2	1	8	9	3	8	6	0	6	5	3	9	1	0	3	7	4	2	8	3	8	1	7	7	6	8	5	1	2	3	8	Total

exp_day	Group	Treatment	Sex	Animal	FoodIn	FoodInKcal	Water	EBalance	AllMeters	VO2	VCO2	VH2O	EE	RER	BodyMass	Photoperiod
5	mHFD	chABC	M	264	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total
5	mHFD	chABC	M	265	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total
5	mHFD	chABC	M	268	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total
5	[illegible]	[illegible]	F	273	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total
5	[illegible]	[illegible]	F	276	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total
5	[illegible]	[illegible]	M	271	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total
5	[illegible]	[illegible]	M	272	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total
5	[illegible]	[illegible]	M	275	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total

Next, we compute cumulative totals or averages of all variables within each photoperiod per day. This is merged with the `total.avg.daily` data so that plots containing dark, light, and total can be obtained from the same data frame.

```
# Compute average within each photoperiod, append to total.avg.daily
pp.avg.daily <- df %>%
  group_by(exp_day,Photoperiod,Group,Treatment,Sex,Animal) %>%
  summarize(
    across(all_of(cols2sum),sum),
    across(all_of(cols2avg),mean)) %>%
  ungroup() %>%
  bind_rows(.,total.avg.daily)
rm(total.avg.daily)
pp.avg.daily
```

exp_day	Photoperiod	Group	Treatment	Sex	Animal	FoodIn	FoodInKcal	Water	EBalance	AllMeters	VO2	VCO2	VH2O	EE	RER	BodyMass
1	0	mHFD	chABC	F	266	[illegible]	[illegible]	[illegible]	-0.1887897	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	0	mHFD	chABC	F	267	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	0	mHFD	chABC	F	269	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	0	mHFD	chABC	F	270	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	0	mHFD	chABC	M	264	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	0	mHFD	chABC	M	265	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	0	mHFD	chABC	M	268	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	0	[illegible]	[illegible]	F	273	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	0	[illegible]	[illegible]	F	276	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	0	[illegible]	[illegible]	M	271	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	0	[illegible]	[illegible]	M	272	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	0	[illegible]	[illegible]	M	275	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

exp_day	Photoperiod	Group	Treatment	Sex	Animal	FoodIn	FoodIntake	WaterIn	EBalance	AllMeters	VO2	VCO2	VH2O	EE	RER	BodyMass
1	1	mHFD	ABC	F	266	[illegible]	[illegible]	[illegible]	-0.4376133	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	1	mHFD	ABC	F	267	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	1	mHFD	ABC	F	269	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	1	mHFD	ABC	F	270	[illegible]	[illegible]	[illegible]	-0.3539345	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	1	mHFD	ABC	M	264	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	1	mHFD	ABC	M	265	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	1	mHFD	ABC	M	268	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	1	mHFD	[illegible]	F	273	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	1	mHFD	[illegible]	F	276	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	1	mHFD	[illegible]	M	271	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	1	mHFD	[illegible]	M	272	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	1	mHFD	[illegible]	M	275	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	0	mHFD	ABC	F	266	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	0	mHFD	ABC	F	267	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	0	mHFD	ABC	F	269	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	0	mHFD	ABC	F	270	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	0	mHFD	ABC	M	264	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	0	mHFD	ABC	M	265	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	0	mHFD	ABC	M	268	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	0	mHFD	[illegible]	F	273	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	0	mHFD	[illegible]	F	276	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	0	mHFD	[illegible]	M	271	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	0	mHFD	[illegible]	M	272	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	0	mHFD	[illegible]	M	275	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	1	mHFD	ABC	F	266	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	1	mHFD	ABC	F	267	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	1	mHFD	ABC	F	269	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	1	mHFD	ABC	F	270	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	1	mHFD	ABC	M	264	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	1	mHFD	ABC	M	265	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	1	mHFD	ABC	M	268	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	1	mHFD	[illegible]	F	273	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	1	mHFD	[illegible]	F	276	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	1	mHFD	[illegible]	M	271	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	1	mHFD	[illegible]	M	272	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	1	mHFD	[illegible]	M	275	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	0	mHFD	ABC	F	266	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	0	mHFD	ABC	F	267	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	0	mHFD	ABC	F	269	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

exp_day	Photoperiod	Group	Treatment	Sex	Animal	FoodIntake	FoodIntake...	WaterIntake	EBalance	AllMeters	VO2	VCO2	VH2O	EE	RER	BodyMass
3	0	mHFD	[illegible]	F	270	2.7023[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	0	mHFD	[illegible]	M	264	1.5518[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	0	mHFD	[illegible]	M	265	2.6841[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	0	mHFD	[illegible]	M	268	2.7235[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	0	[illegible]	[illegible]	F	273	2.0596[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	0	[illegible]	[illegible]	F	276	2.0364[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	0	[illegible]	[illegible]	M	271	2.2800[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	0	[illegible]	[illegible]	M	272	3.3224[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	0	[illegible]	[illegible]	M	275	1.9330[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	1	mHFD	[illegible]	F	266	0.9673[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	1	mHFD	[illegible]	F	267	0.4294[illegible]	[illegible]	[illegible]	-0.4317954	66.648[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	1	mHFD	[illegible]	F	269	0.6541[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	1	mHFD	[illegible]	F	270	1.1168[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	1	mHFD	[illegible]	M	264	1.2251[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	1	mHFD	[illegible]	M	265	1.9985[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	1	mHFD	[illegible]	M	268	0.6367[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	1	[illegible]	[illegible]	F	273	1.5304[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	1	[illegible]	[illegible]	F	276	1.0048[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	1	[illegible]	[illegible]	M	271	1.7746[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	1	[illegible]	[illegible]	M	272	1.0781[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	1	[illegible]	[illegible]	M	275	1.0516[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	0	mHFD	[illegible]	F	266	3.0258[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	0	mHFD	[illegible]	F	267	1.5953[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	0	mHFD	[illegible]	F	269	1.2985[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	0	mHFD	[illegible]	F	270	2.1065[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	0	mHFD	[illegible]	M	264	2.1183[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	0	mHFD	[illegible]	M	265	2.7036[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	0	mHFD	[illegible]	M	268	2.4406[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	0	[illegible]	[illegible]	F	273	2.4163[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	0	[illegible]	[illegible]	F	276	2.1554[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	0	[illegible]	[illegible]	M	271	2.5242[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	0	[illegible]	[illegible]	M	272	1.9925[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	0	[illegible]	[illegible]	M	275	2.3532[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	1	mHFD	[illegible]	F	266	1.7050[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	1	mHFD	[illegible]	F	267	1.0184[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	1	mHFD	[illegible]	F	269	1.7228[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	1	mHFD	[illegible]	F	270	1.4340[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	1	mHFD	[illegible]	M	264	1.5723[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	1	mHFD	[illegible]	M	265	1.5951[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	1	mHFD	[illegible]	M	268	1.3086[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

exp_day	Photoperiod	Group	Treatment	Sex	Animal	FoodIn	FoodInKcal	WaterIn	EBalance	AllMeters	VO2	VCO2	VH2O	EE	RER	BodyMass
4	1	mHFD	HDIchABC	F	273	1.2610	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	1	mHFD	HDIchABC	F	276	1.3880	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	1	mHFD	HDIchABC	M	271	1.1783	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	1	mHFD	HDIchABC	M	272	1.5130	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	1	mHFD	HDIchABC	M	275	1.0117	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	0	mHFD	DABC	F	266	0.8251	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	0	mHFD	DABC	F	267	1.3467	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	0	mHFD	DABC	F	269	1.2284	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	0	mHFD	DABC	F	270	1.7547	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	0	mHFD	DABC	M	264	1.5560	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	0	mHFD	DABC	M	265	1.6408	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	0	mHFD	DABC	M	268	0.6042	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	0	mHFD	HDIchABC	F	273	0.4203	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	0	mHFD	HDIchABC	F	276	0.4449	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	0	mHFD	HDIchABC	M	271	1.7409	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	0	mHFD	HDIchABC	M	272	1.2506	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	0	mHFD	HDIchABC	M	275	1.2706	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	1	mHFD	DABC	F	266	0.8919	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	1	mHFD	DABC	F	267	1.1695	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	1	mHFD	DABC	F	269	0.2710	[illegible]	[illegible]	[illegible] (-1.3703169)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	1	mHFD	DABC	F	270	0.4315	[illegible]	[illegible]	[illegible] (-1.4841478)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	1	mHFD	DABC	M	264	0.7356	[illegible]	[illegible]	[illegible] (-0.0499253)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	1	mHFD	DABC	M	265	1.2662	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	1	mHFD	DABC	M	268	1.1389	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	1	mHFD	HDIchABC	F	273	0.9998	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	1	mHFD	HDIchABC	F	276	0.9670	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	1	mHFD	HDIchABC	M	271	1.4269	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	1	mHFD	HDIchABC	M	272	1.1020	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	1	mHFD	HDIchABC	M	275	0.6769	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	Total	mHFD	DABC	F	266	0.5748	[illegible]	[illegible]	[illegible] (-0.6264031)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	Total	mHFD	DABC	F	267	1.1352	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	Total	mHFD	DABC	F	269	1.6775	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	Total	mHFD	DABC	F	270	1.4772	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	Total	mHFD	DABC	M	264	1.5098	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	Total	mHFD	DABC	M	265	1.5487	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	Total	mHFD	DABC	M	268	1.7384	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	Total	mHFD	HDIchABC	F	273	1.4280	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

exp_day	Photoperiod	Group	Treatment	Sex	Animal	FoodIn	[illegible]	WaterIn	EBalance	AllMeters	VO2	VCO2	VH2O	EE	RER	BodyMass
1	Total	mHFD	IlchABC	F	276	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	Total	mHFD	IlchABC	M	271	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	Total	mHFD	IlchABC	M	272	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	Total	mHFD	IlchABC	M	275	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	Total	mHFD	ABC	F	266	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	Total	mHFD	ABC	F	267	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	Total	mHFD	ABC	F	269	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	Total	mHFD	ABC	F	270	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	Total	mHFD	ABC	M	264	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	Total	mHFD	ABC	M	265	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	Total	mHFD	ABC	M	268	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	Total	mHFD	IlchABC	F	273	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	Total	mHFD	IlchABC	F	276	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	Total	mHFD	IlchABC	M	271	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	Total	mHFD	IlchABC	M	272	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	Total	mHFD	IlchABC	M	275	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	Total	mHFD	ABC	F	266	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	Total	mHFD	ABC	F	267	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	Total	mHFD	ABC	F	269	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	Total	mHFD	ABC	F	270	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	Total	mHFD	ABC	M	264	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	Total	mHFD	ABC	M	265	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	Total	mHFD	ABC	M	268	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	Total	mHFD	IlchABC	F	273	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	Total	mHFD	IlchABC	F	276	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	Total	mHFD	IlchABC	M	271	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	Total	mHFD	IlchABC	M	272	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	Total	mHFD	IlchABC	M	275	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	Total	mHFD	ABC	F	266	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	Total	mHFD	ABC	F	267	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	Total	mHFD	ABC	F	269	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	Total	mHFD	ABC	F	270	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	Total	mHFD	ABC	M	264	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	Total	mHFD	ABC	M	265	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	Total	mHFD	ABC	M	268	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	Total	mHFD	IlchABC	F	273	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	Total	mHFD	IlchABC	F	276	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	Total	mHFD	IlchABC	M	271	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	Total	mHFD	IlchABC	M	272	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	Total	mHFD	IlchABC	M	275	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Total	mHFD	ABC	F	266	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

exp_day	Photoperiod	Group	Treatment	Sex	Animal	FoodIn.g	FoodIn.kcal	WaterIn.g	EBalance	AllMeters	VO2	VCO2	VH2O	EE	RER	BodyMass
5	Total	[illegible]	[illegible]	F	267	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Total	[illegible]	[illegible]	F	269	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Total	[illegible]	[illegible]	F	270	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Total	[illegible]	[illegible]	M	264	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Total	[illegible]	[illegible]	M	265	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Total	[illegible]	[illegible]	M	268	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Total	[illegible]	[illegible]	F	273	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Total	[illegible]	[illegible]	F	276	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Total	[illegible]	[illegible]	M	271	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Total	[illegible]	[illegible]	M	272	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Total	[illegible]	[illegible]	M	275	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Finally, we compute cumulative totals and averages across the entire experiment, for each day…

```
# Compute average across variables for entire experiment
total.avg <- df %>%
  group_by(Group,Treatment,Sex,Animal) %>%
  summarize(
    across(all_of(cols2sum),sum),
    across(all_of(cols2avg),mean)) %>%
  mutate(Photoperiod = "Total") %>%
  ungroup()
```

… and within each photoperiod.

```
# Compute the overall average daily value for every requested variable across the whole ex
pp.avg.total <- pp.avg.daily %>%
  group_by(Photoperiod,Group,Treatment,Sex,Animal) %>%
  summarize(
    across(all_of(c(cols2sum,cols2avg)),mean)) %>%
  ungroup()
rm(total.avg)
pp.avg.total
```

Photoperiod	Group	Treatment	Sex	Animal	FoodIn.g	FoodIn.kcal	WaterIn.g	EBalance	AllMeters	VO2	VCO2	VH2O	EE	RER	BodyMass
0	[illegible]	[illegible]	F	266	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0	[illegible]	[illegible]	F	267	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0	[illegible]	[illegible]	F	269	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Photoperiod	Group	Treatment	Sex	Animal	FoodIn...	FoodIn...	WaterIn...	EBalance	AllMeters	VO2	VCO2	VH2O	EE	RER	BodyMass
0	mHFD	[illegible]	F	270	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0	mHFD	[illegible]	M	264	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0	mHFD	[illegible]	M	265	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0	mHFD	[illegible]	M	268	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0	[illegible]	[illegible]	[illegible]	273	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0	[illegible]	[illegible]	[illegible]	276	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0	[illegible]	[illegible]	[illegible]	271	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0	[illegible]	[illegible]	[illegible]	272	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0	[illegible]	[illegible]	[illegible]	275	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	mHFD	[illegible]	F	266	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	mHFD	[illegible]	F	267	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	mHFD	[illegible]	F	269	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	mHFD	[illegible]	F	270	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	mHFD	[illegible]	M	264	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	mHFD	[illegible]	M	265	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	mHFD	[illegible]	M	268	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	273	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	276	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	271	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	272	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	275	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	mHFD	[illegible]	F	266	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	mHFD	[illegible]	F	267	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	mHFD	[illegible]	F	269	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	mHFD	[illegible]	F	270	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	mHFD	[illegible]	M	264	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	mHFD	[illegible]	M	265	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	mHFD	[illegible]	M	268	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	273	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	276	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	271	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	272	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	275	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]