

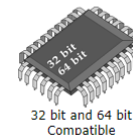
MCC - MEAL CRITERION CALCULATION - START GUIDE

MCC CURRENT VERSION: 1.10.8584.18903 || START GUIDE UPDATE: 2023-07-03

DOWNLOAD MCC <https://www.nutritionmodels.com/mcc.html>

REQUIREMENTS

- R Software
 - <https://cran.r-project.org/mirrors.html>
 - Download R software for Windows:
 - <https://cran.microsoft.com/>
 - install R for the first time
- Microsoft .NET Framework 4 (Web Installer)
 - <https://www.microsoft.com/en-us/download/details.aspx?displaylang=en&id=17851>



Download

MCC GENERAL INFO

- It works with most PC-compatible computers that have Microsoft Windows 7 or later, 32 or 64-bits
- The MCC software is programmed with Microsoft Visual Studio 2010 using Visual Basic and .NET 4.0 framework
- It uses R scripting v. 2.0 or later to perform calculations

INSTALL MCC

- The latest script files for MCC can be downloaded from <https://www.nutritionmodels.com/mcc.html>
 - Use of the latest script version: Version 1.8.1 (July 3, 2023)
 - Download the latest MCC Script; it will be a ZIP file ("mcc_1-8-1.zip")
 - This ZIP file has the ZZZ and ZZX scripts: "mcc v1.8.1.ZZZ" and "mcc v1.8.1.ZZX"
 - UNZIP (extract) THE ZIP FILE containing the MCC script 1.8.1
 - Rename the ZZZ script "mcc v1.8.1.ZZZ" to "mcc.zzz"
 - Rename the ZZX script "mcc v1.8.1.ZZX" to "mcc.zzx"
 - Copy the mcc.zzz and mcc.zzx files to "[User Name]\Documents\TAMU\MCC Files"
 - Replace the old ones
 - Only the mcc.zzz or mcc.zzx script files will be used by the MCC software
 - You can keep other versions in the same folder (you will have different file names)
- Once the MCC is installed, you are able to run it 10 times before it must be purchased and registered.
- Register by submitting the registration number on the Purchase Page.

DEVELOPERS



Dr. Luis O. Tedeschi
Professor
Texas A&M University
Department of Animal Science
230 Kleberg Center
2471 TAMU
College Station, TX 77843-2471, US



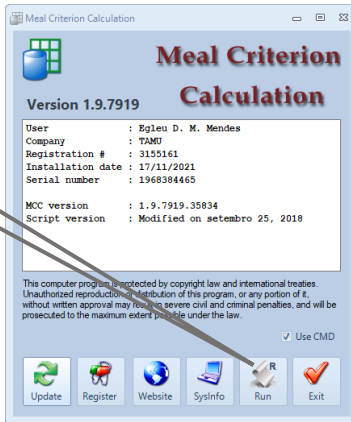
Egleu D. M. Mendes, M.Sc.
Graduate Research Assistant
Ph.D. Student at Texas A&M University
Department of Animal Science
232 Kleberg Center
2471 TAMU
College Station, TX 77843-2471, US



1. OPEN

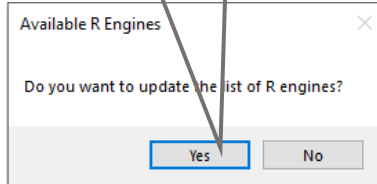
A

Click
RUN



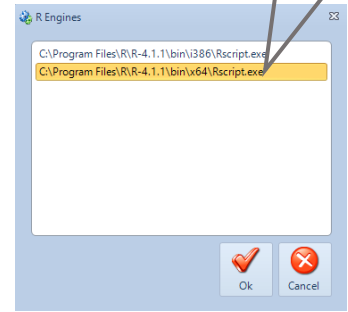
B

Update if needed



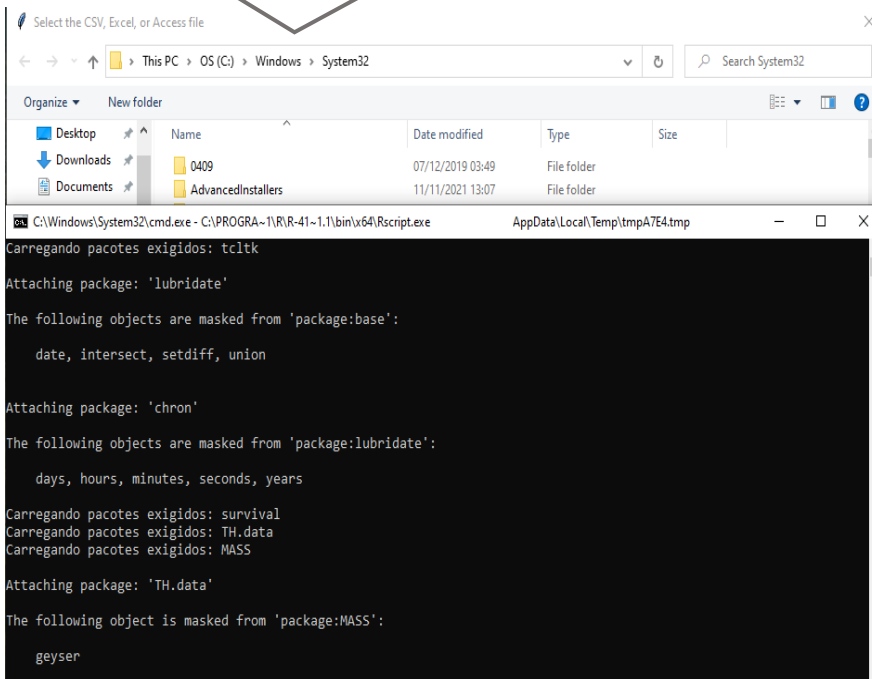
B.1

Select the
version >> OK



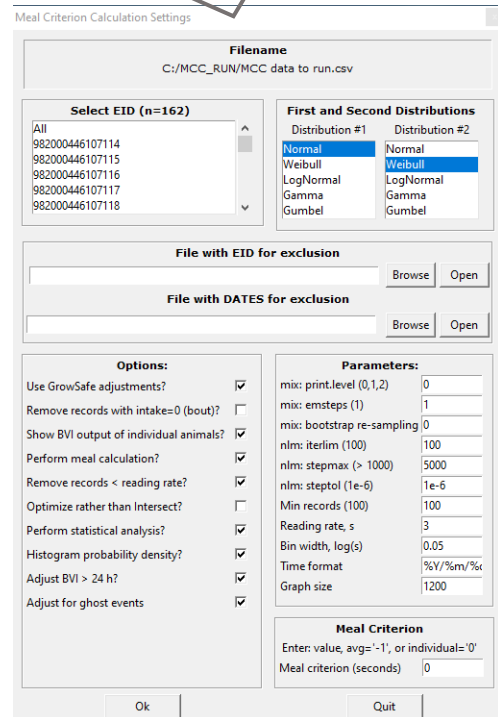
C

Select the file with the behavior data to run on MCC



D

MCC Main-Screen



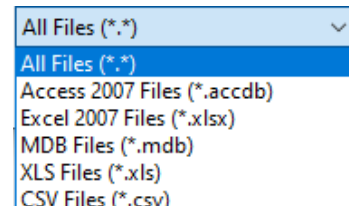
C.1 - COMMENTS

- MCC will create a folder ("Output") in the file location from the selected MCC data to run
- All output data, graphs, etc., will be in this Output folder

C.2 - FILE

FILES FORMAT MUST BE:

- Access; Excel; or CSV
- Make sure the file has the right header
- **THE CSV MUST BE SEPARATE BY A COMMA (NOT A SEMICOLON)**
- **DATE/TIME MUST BE SET AS: YYYY-MM-DD HH:MM:SS**



2. RUN

A

- Select All or animal by animal

B

- Select the 1st and 2nd Distributions
- Recommendation
 - NORMAL - WEIBULL

- [Bailey, J. C., L. O. Tedeschi, E. D. M. Mendes, J. E. Sawyer, and G. E. Carstens. 2012. Evaluation of bimodal distribution models to determine meal criterion in heifers fed a high-grain diet.](#)

C

- Select the file with EID and DATES for exclusion

D

- Use GrowSafe adjustments:
 - adjustments for overlaps
- Remove records with intake=0 (bout)?
 - If intake=0, remove the data
- Show BVI output of individuals animals?
 - Show Bunk Visit Intervals (BVI)
- Perform meal calculation?
 - Remove records < reading rate?
 - Remove records when the duration of the feeding event < "Reading rate, s"
- Optimize rather than Intersect?
 - Meal criterion value will be based on optimization rather than the intersection of the distributions
- Perform statistical analysis?
- Histogram probability density?
- Adjust BVI > 24h?
 - adjust for BVI when start at one day and end at the next day (BVI close to midnight)
- Adjust for ghost events

E

- mix: print.level(01,2,)
- mix: emsteps(1)
- mix: bootstrap re-sampling
- nlm: iterlim(100)
- nlm: stepmax(>1000)
- nlm: steptol (1e-6)

Meal Criterion Calculation Settings

Filename
C:/MCC_RUN/MCC_data_run.csv

Select EID (n=162)

All
982000446107114
982000446107115
982000446107116
982000446107117
982000446107118

First and Second Distributions

Distribution #1	Distribution #2
Normal	Normal
Weibull	Weibull
LogNormal	LogNormal
Gamma	Gamma
Gumbel	Gumbel

File with EID for exclusion
Browse Open

File with DATES for exclusion
Browse Open

Options:

Use GrowSafe adjustments?	<input checked="" type="checkbox"/>
Remove records with intake=0 (bout)?	<input type="checkbox"/>
Show BVI output of individual animals?	<input checked="" type="checkbox"/>
Perform meal calculation?	<input checked="" type="checkbox"/>
Remove records < reading rate?	<input checked="" type="checkbox"/>
Optimize rather than Intersect?	<input type="checkbox"/>
Perform statistical analysis?	<input checked="" type="checkbox"/>
Histogram probability density?	<input checked="" type="checkbox"/>
Adjust BVI > 24 h?	<input checked="" type="checkbox"/>
Adjust for ghost events	<input checked="" type="checkbox"/>

Parameters:

mix: print.level (0,1,2)	0
mix: emsteps (1)	1
mix: bootstrap re-sampling	0
nlm: iterlim (100)	100
nlm: stepmax (> 1000)	5000
nlm: steptol (1e-6)	1e-6
Min records (100)	100
Reading rate, s	1
Bin width, log(s)	0.05
Time format	%Y/%m/%d
Graph size	1200

Meal Criterion
Enter: value, avg=-1, or individual='0'
Meal criterion (seconds) 0

Ok Quit

E (continue)

- Min records (100)
 - Animal minimum records to run MCC
- Reading rate, s (**CHECK YOUR SYSTEM**)
 - System EID reading rate in seconds (latest systems use 1 second; EID read/second)
- Bin width, log(s)
- Time format
- Graph Size

F

- Meal Criterion (MC) calculation
 - -1 = MC by average of all animals; meal data will be based on the average
 - (it is "-1", minus 1)
 - 0 = MC based on individual MC; meal data will be based on individual MC

3. OUTPUT - FILES

- bvi_ghost1_day.csv
- bvi_ghost1_scales.csv
- bvi_ghost2_day.csv
- bvi_ghost2_scales.csv
- bvi_nodays_day.csv
- bvi_nodays_scales.csv
- out_all_bvi.csv
- output_bvi.csv
- output_bvi2.csv
- output_meal.csv
- bvi_Ghost1_p1.png (p1, p2, p3)
- bvi_ghost2_p1.png (p1, p2, p3)
- BVI_HIST.png
- bvi_nodays_p1.png (p1, p2, p3)
- Histogram_xxxx.png (x = animal EID)
- Histogram_All.png
- Intersect_999999999.png
- Intersect_xxxx.png (x = animal EID)
- MixPlot_xxxx.png (x = animal EID)
- MixPlot_All.png
- Output_xxxx.txt (x = animal EID)
- Output_All.txt
- Output_meal.txt
- stats_bvi.txt

output_meal.csv

	Date	MealFreq	EID	MeanMealDur	MeanMealIntake	SumMealDur	SumMealIntake
49	2021-10-21	11	982000446107114	490.0909092	1432.727273	5391.000001	15760
50	2021-10-22	11	982000446107114	751.1818181	1885.454545	8262.999999	20740
51	2021-10-23	13	982000446107114	587.3076922	1703.076923	7634.999999	22140
52	2021-10-24	11	982000446107114	602.4545455	1531.818182	6627	16850

- Date: YYYY-MM-DD
- MealFreq: events/day
- MeanMealDur: mean meal duration in seconds
- MeanMealIntake: mean meal intake in grams
- SumMealDur: sum of meal duration in seconds
- SumMealIntake: sum of meal intake in grams
- COMMENTS: The data is based on the settings from Meal Criterion (MC) calculation
 - -1 = meal data based on average MC of all animals; 0 = meal data based on individual MC

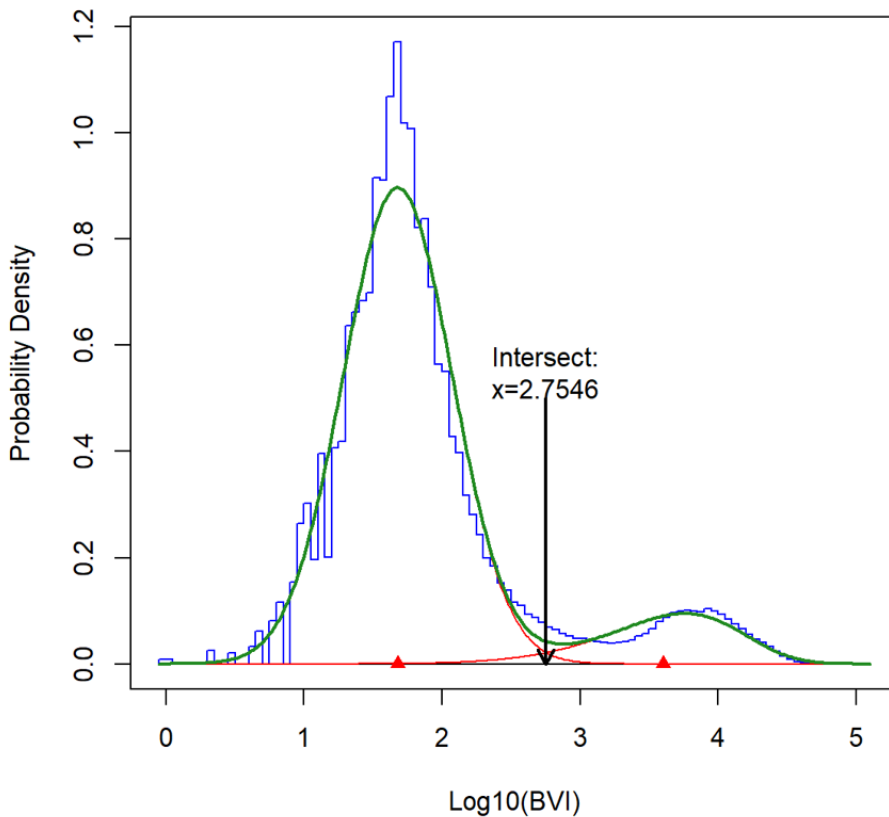
output_bvi.csv

- dist1-dist2: distribution 1 and distribution 2 used for analysis
- p
- mu1
- s1
- mu2
- Intersect: use to calculate the Meal criterion for each animal (MC in seconds = 10^{\wedge} Intersect)
- AIC: Akaike information criterion (AIC); evaluate how well the model fits the data
- Best Dist
- Least AIC
- Least Intersect

EID	dist1-dist2	p	mu1	s1	mu2	s2	Intersect	AIC	Best Dist	Least AIC	Least Intersect
1	982000446107114 Normal-Weibull	0.654321312	1.721225779	0.21563511	2.667655581	0.961755417	2.180065726	453.4655054	Normal-Weibull	453.4655054	2.180065726
2	982000446107115 Normal-Weibull	0.851560589	1.608191914	0.382429459	3.592802474	0.535258314	2.643412234	465.565713	Normal-Weibull	465.565713	2.643412234
3	982000446107116 Normal-Weibull	0.841236577	1.586350531	0.3739677	3.490465363	0.578772839	2.566742991	481.164274	Normal-Weibull	481.164274	2.566742991
4	999999999 Normal-Weibull	0.837984234	1.648574217	0.367585948	3.499825891	0.57016141	2.604952668	1326.048261	Normal-Weibull	1326.048261	2.604952668

- MC (Meal Criterion) for the average of all animals
- Intersect
 - LOG10 of BVI (bunk visit interval)
 - The result in seconds = $10^{\text{intersect}}$ (e.g.: $10^{2.7546} = 568.33$ sec = 9.47 minutes)
 - 1st distribution = short BVI
 - 2nd distribution = long BVI
- More information about this data is on: "Histogram_All.png", and "Output_All.txt":
- Each animal will have its own MixPlot_xxx graph (e.g.: "MixPlot_982000446107412.png"), Histogram_xxx.png and Output_xxx.txt

p:0.8848, m1:1.6768, s1:0.3937, m2:3.6008, s2:0.5064, intersect:2.7546



(n=4402). Distribution: Normal-Weibull. AIC: 54789.5022