Estimating test-day milk yields by modeling proportional daily yields: Going beyond linearity

Xiao-Lin Wu,[1,2] George R. Wiggans,[1] H. Duane Norman,[1] Heather A. Enzenauer,[1] Asha M. Miles,[3] Curtis P. Van Tassell,[3] Ransom L. Baldwin VI,[3] Javier Burchard,[1] and João Dürr [1]

[1] Council on Dairy Cattle Breeding, Bowie, MD, USA.

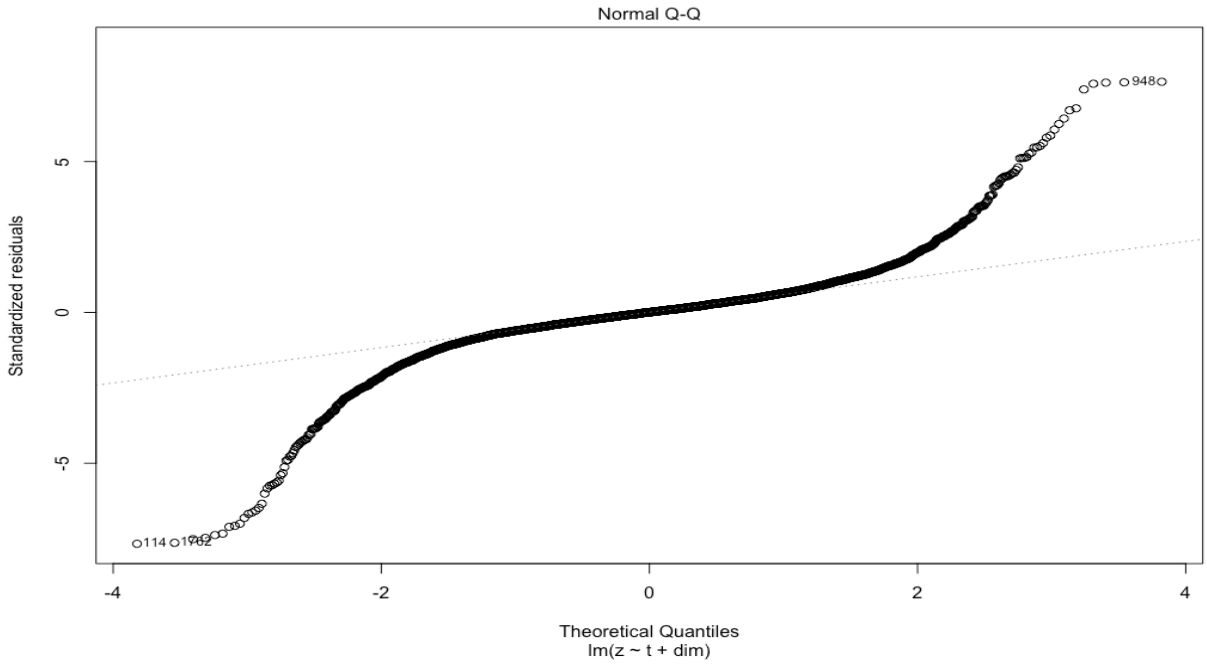
[2] Department of Animal and Dairy Sciences, University of Wisconsin, Madison, WI, USA.

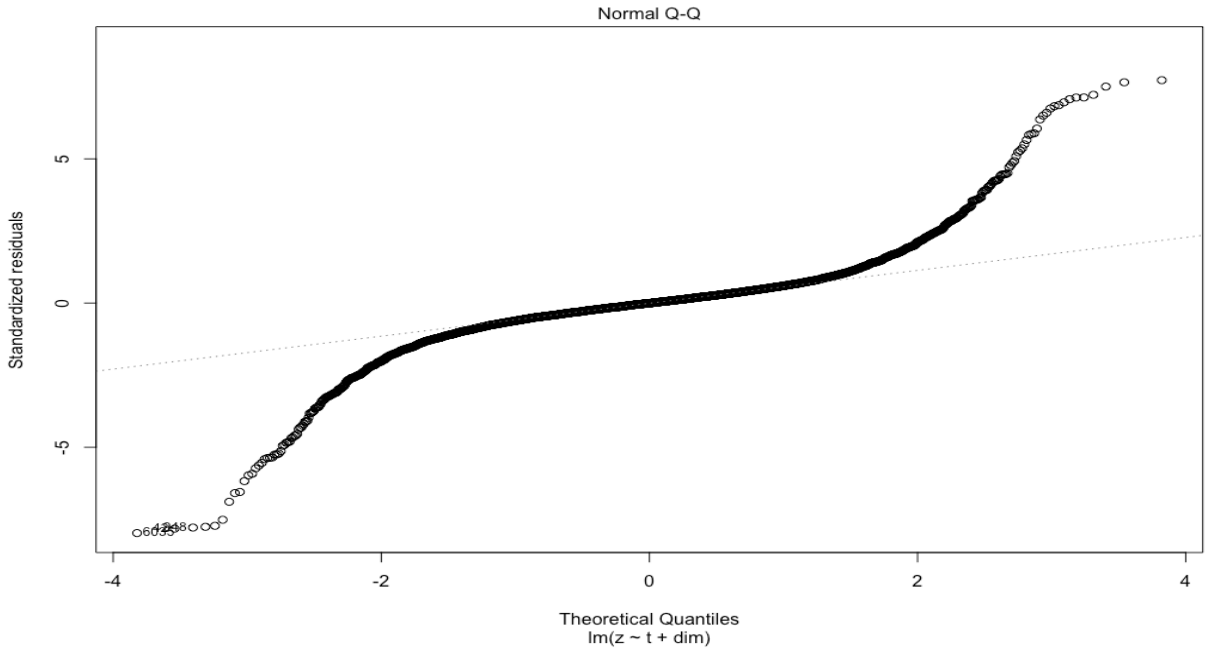
[3] USDA, Agricultural Research Service, Animal Genomics and Improvement Laboratory, Beltsville, MD, USA.

Correspondence: nick.wu@uscdcb.com

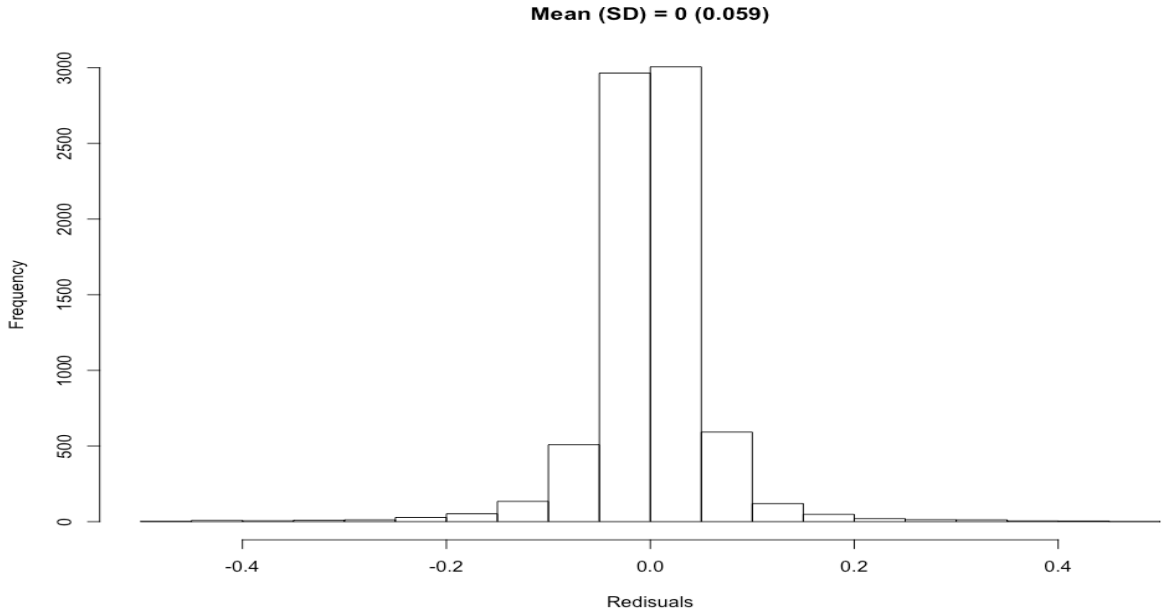
Supplementary figures

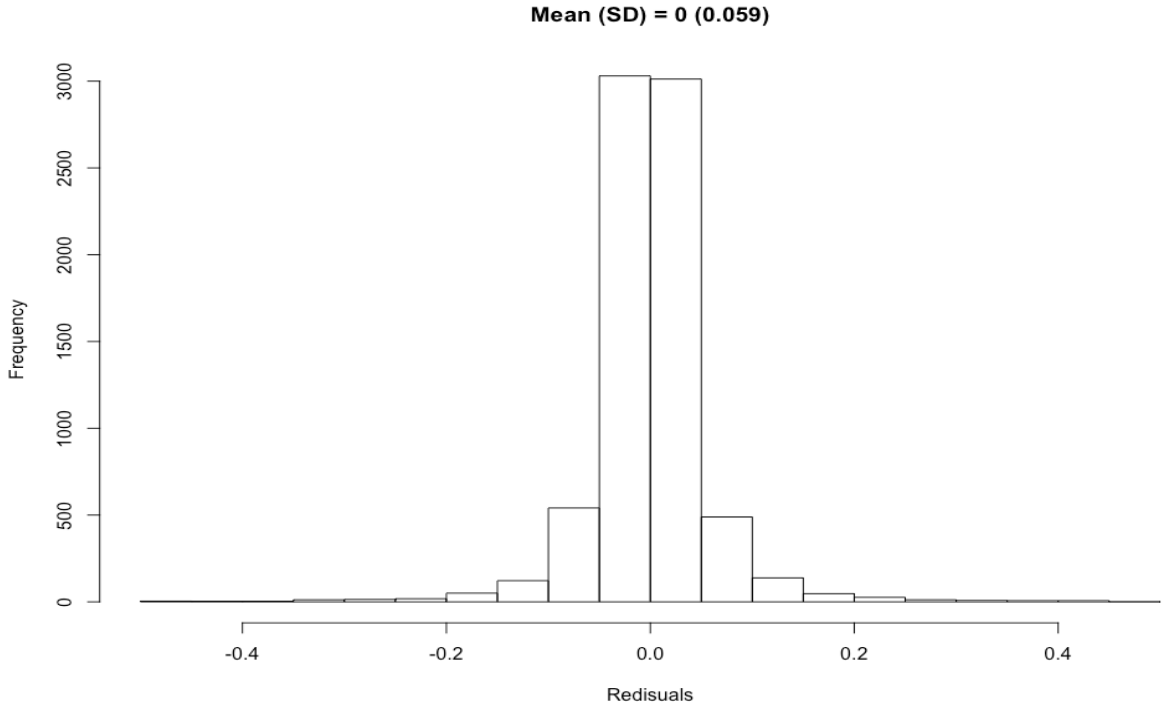
Supplementary Figure S1 Test of the normality of the residuals obtained from linearly fitting morning (upper) or evening (bottom) proportional daily milk yields on milking interval time and days in milk as a linear covariate



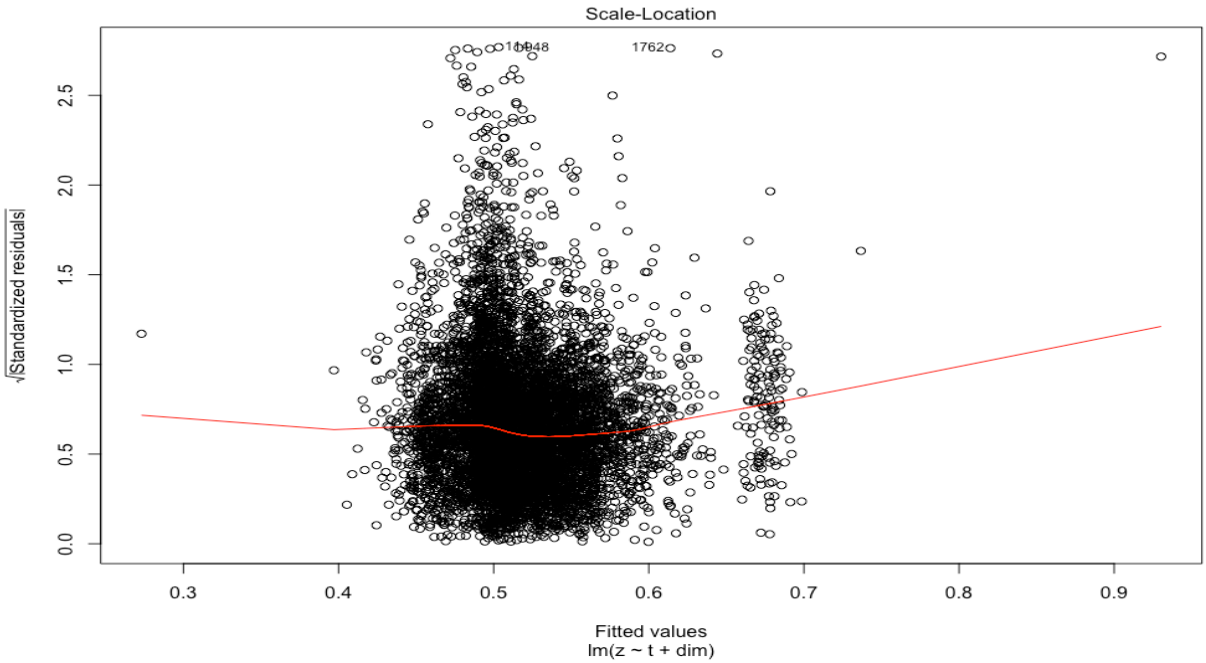


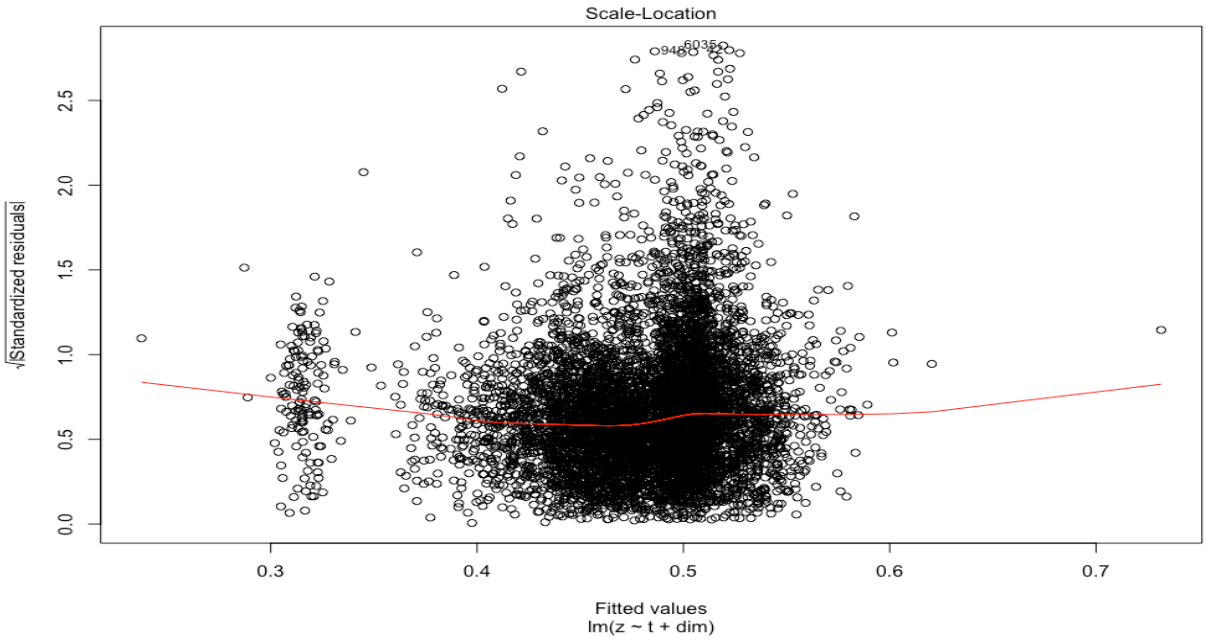
Supplementary Figure S2 The distribution of the residuals obtained from linearly fitting morning (upper) or evening (bottom) proportional daily milk yields linearly on milking interval time and days in milk as a linear covariate



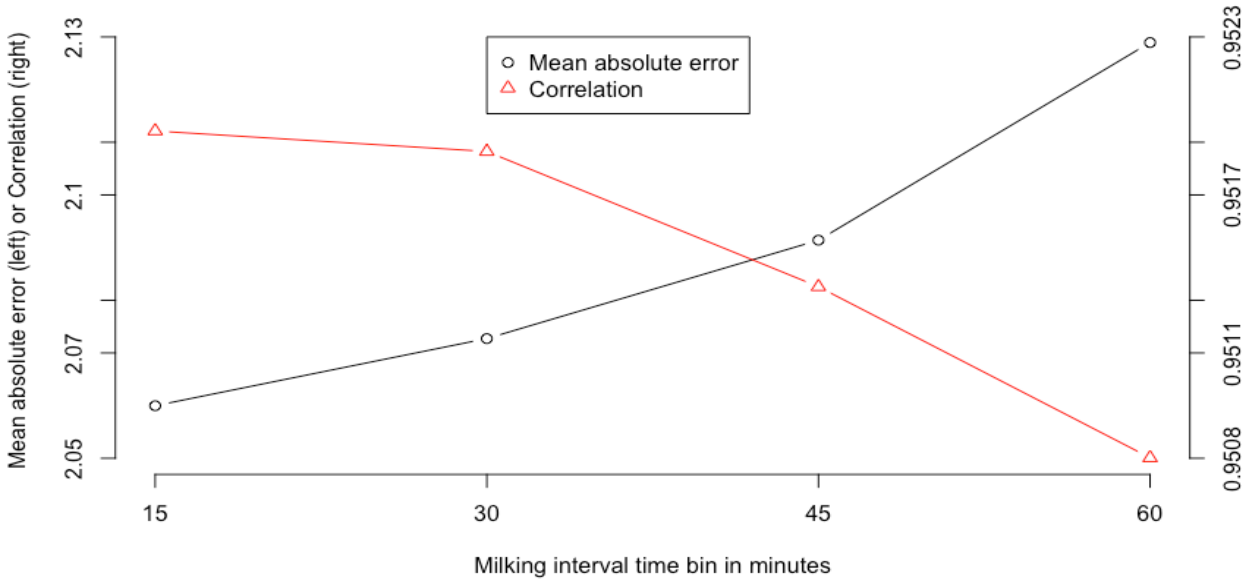


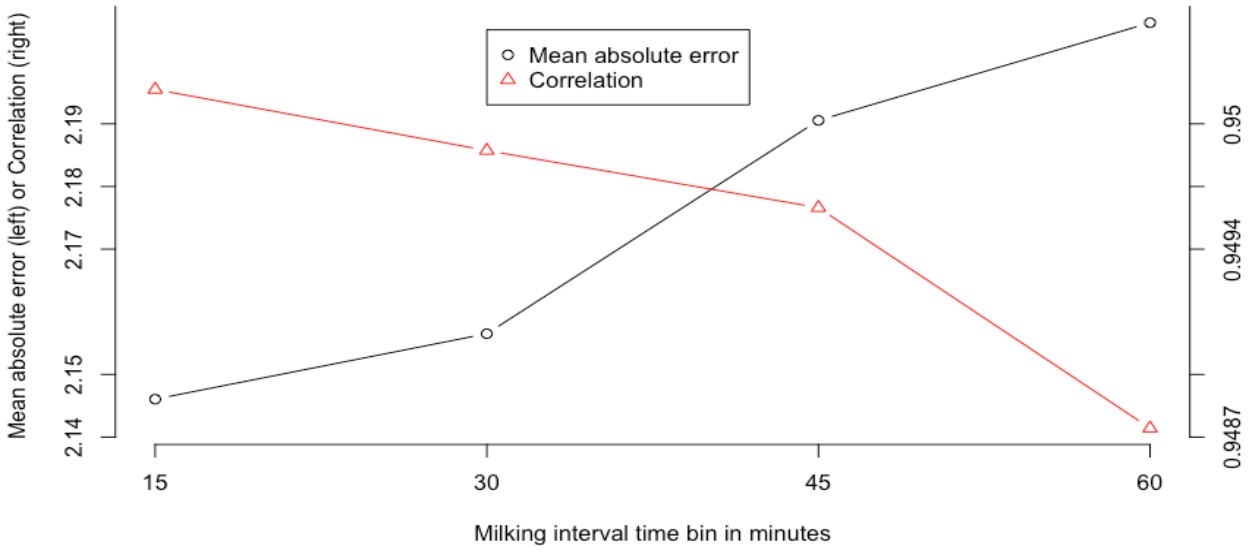
Supplementary Figure S3 Test of residual variance homoscedasticity for linearly fitting morning (upper) or evening (bottom) proportional daily milk yields on milk interval time with days in milk as a covariate



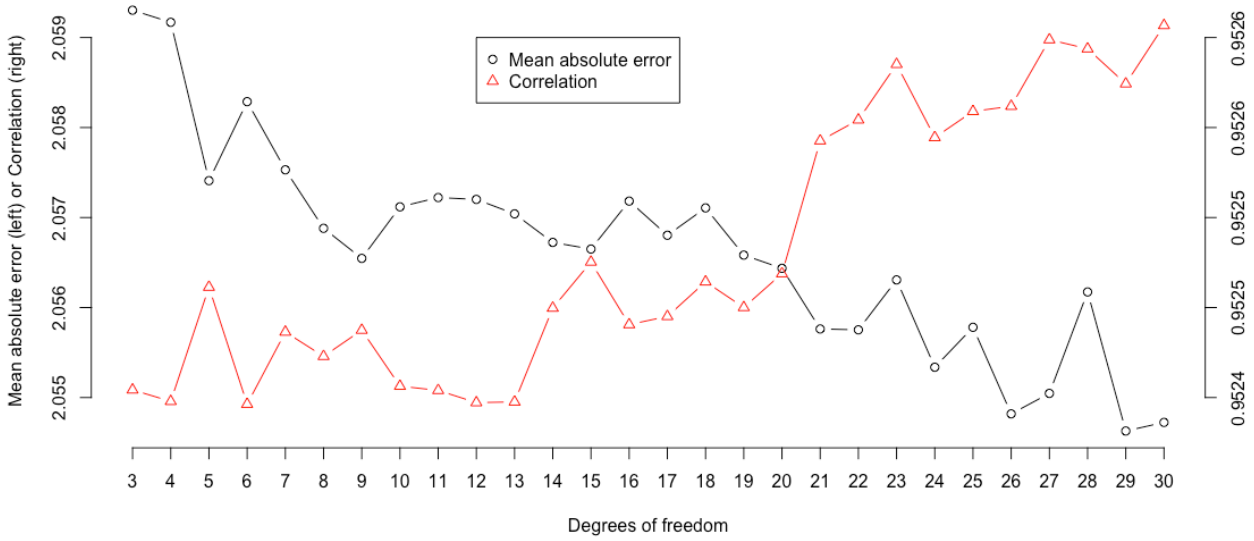


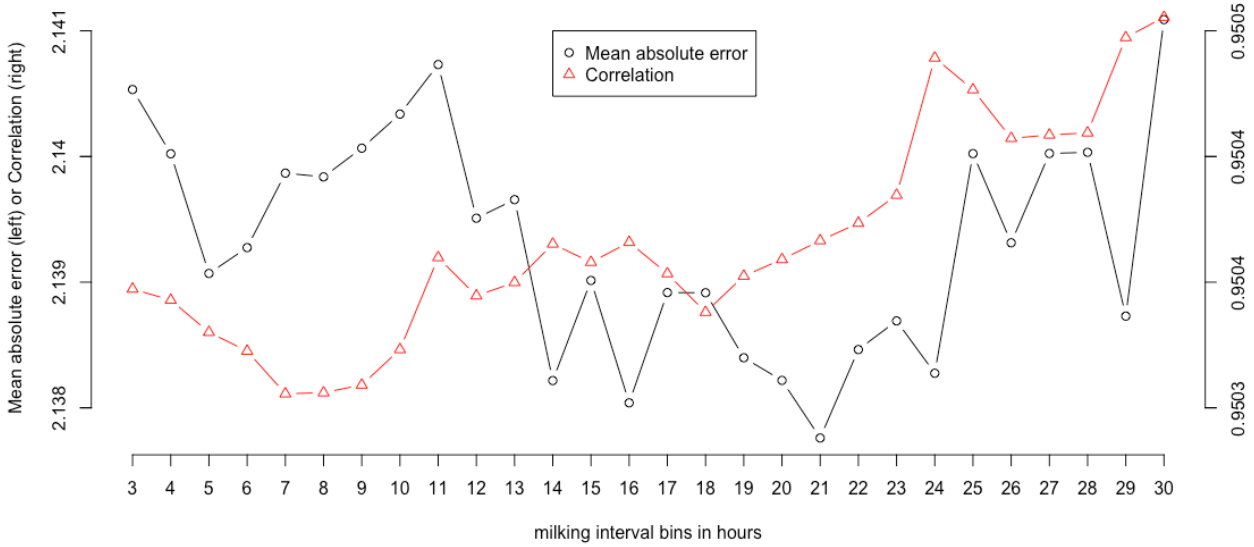
Supplementary Figure S4. Trajectories of mean absolute errors and correlations between actual and estimated daily milk yields obtained when fitting morning (upper) or evening (bottom) proportional daily milk yields on milking interval time as step functions with a varying bin width, ranging from 15 to 60 minutes, and days in milk as a linear covariate.





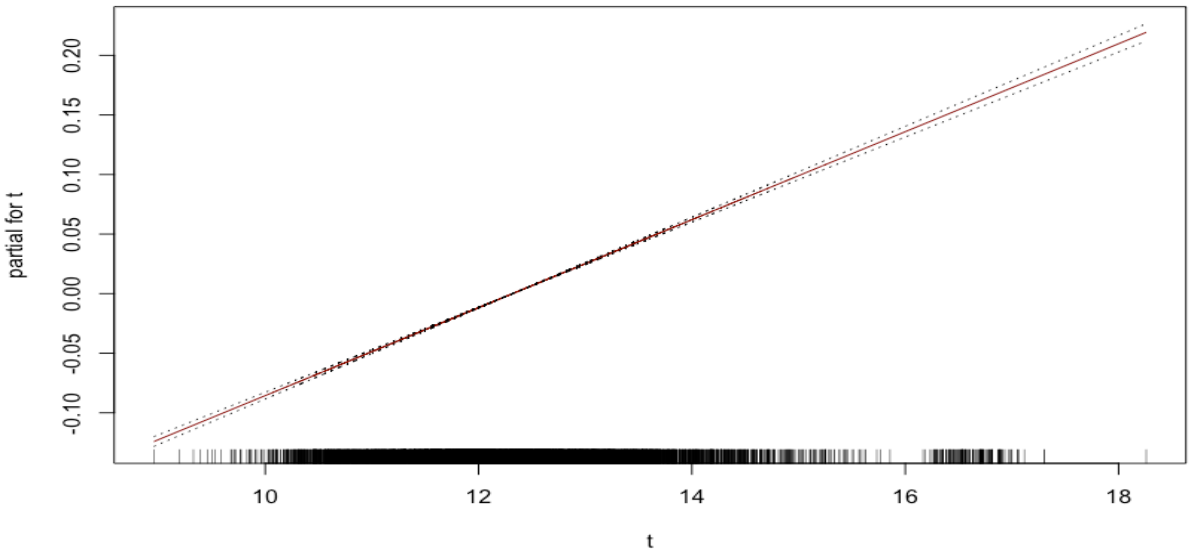
Supplementary Figure S5. Trajectories of mean absolute errors and correlations between actual and estimated daily milk yields obtained when fitting morning (upper) and evening (bottom) proportional daily milk yields on milking interval time as regression splines (cubic spline) with between 3 and 30 degrees of freedom, and with days in milk as a linear covariate.



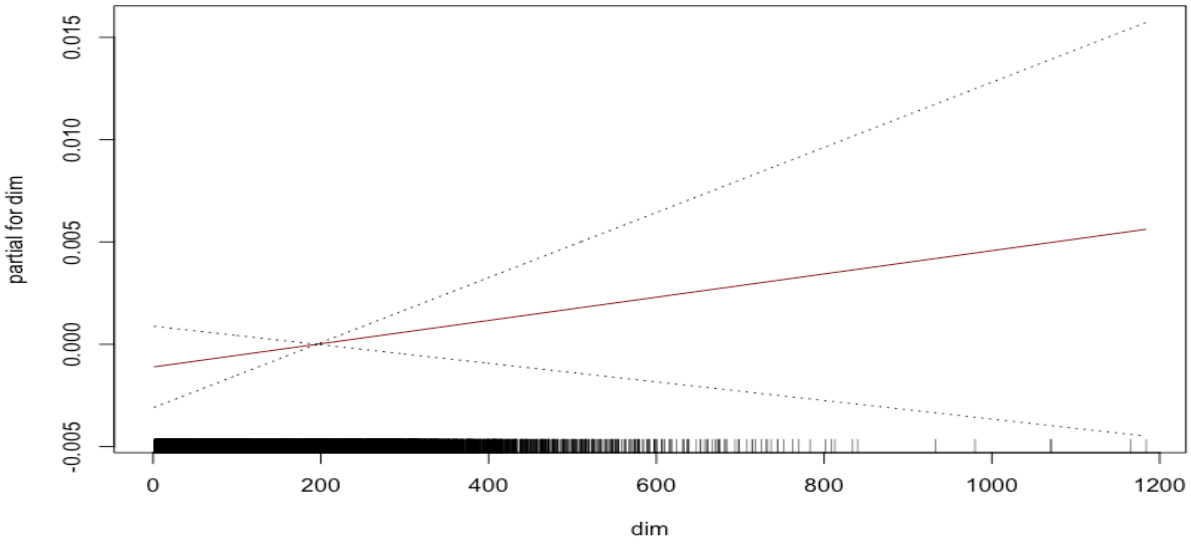


Supplementary Figure 6. Illustration of the relationships between proportional daily milk yields (z) and the predictor variables, milking interval time (t) and days in milk (d) based on generalized additive models with linear predictors: (A) morning proportional milk yields versus linear morning milking interval time; (B) morning proportional milk yields versus linear days in milk; (C) evening proportional milk yields versus linear evening milking interval time; (D) evening proportion milk yields versus linear days in milk. Dark-red solid lines represent means, and green dotted lines represent 95% confidence intervals.

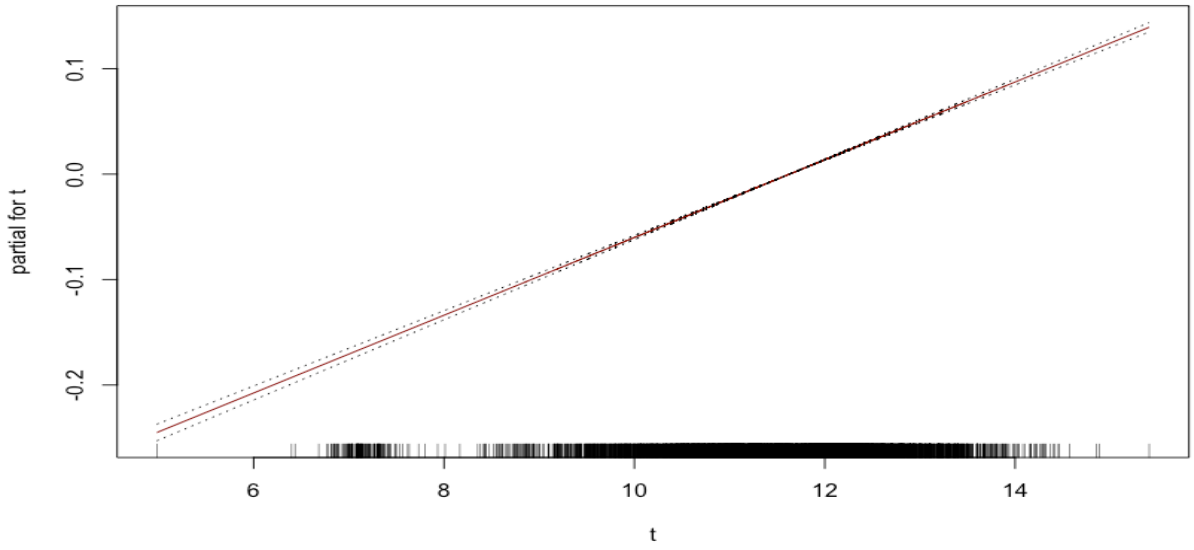
(A)



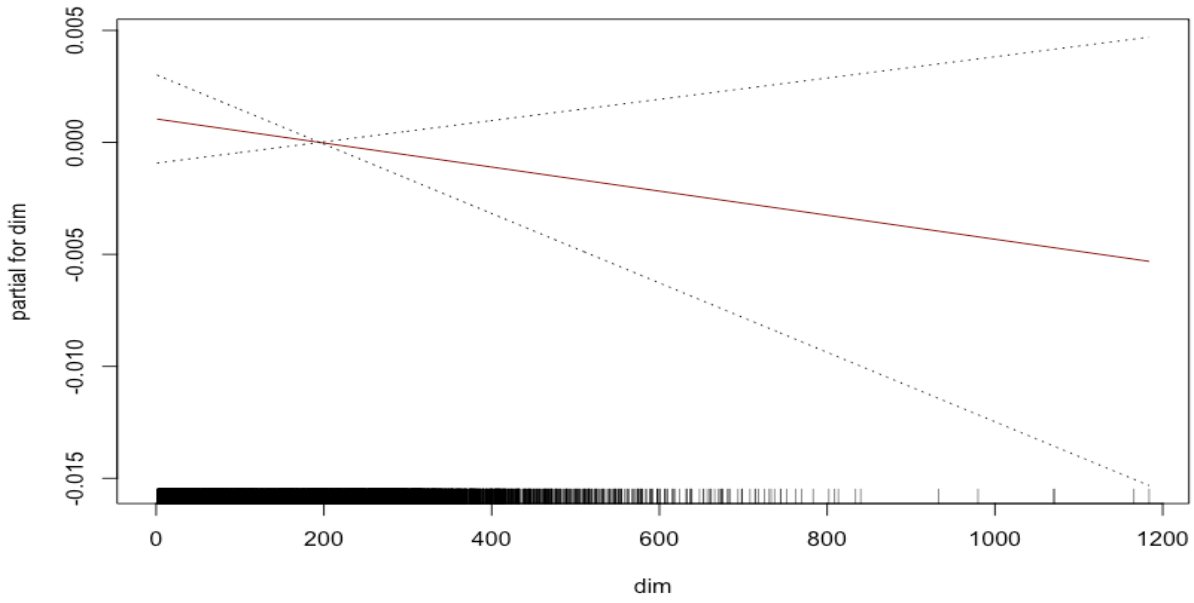
(B)



(C)


partial for t
0.1
0.0
-0.1
-0.2
6
8
10
12
14
t

(D)


partial for dim
0.005
0.000
-0.005
-0.010
-0.015
0
200
400
600
800
1000
1200
dim