**Code S1: Construction of artificial phenotyping data**

MockDataSet2 **<-** **function**(NoAssayDates=300, VariableMean, VariableSD, BatchSD, MaleEffect=1){

 numberBatches=c(1:NoAssayDates)

 BatchEffect=rnorm(n=NoAssayDates, mean=0, sd=BatchSD)

 ToDo=data.frame(Index=numberBatches, ImpactBatch=BatchEffect)

 results=c()

 **for** (bob **in** numberBatches) {

 df=subset(x=ToDo, Index==bob)

 DependentVariable\_Female=rnorm(n=7, mean=(VariableMean+df$ImpactBatch), sd=VariableSD)

 DependentVariable\_Male=rnorm(n=7, mean=(VariableMean+df$ImpactBatch+MaleEffect), sd=VariableSD)

 DependentVariable=c(DependentVariable\_Female, DependentVariable\_Male)

 Gender=c(rep.int("Female", times=7), rep.int("Male", times=7))

 Genotype=rep.int("+/+", times=14)

 Assay.Date=rep.int(x=paste(bob, "date", sep="\_"), times=14)

 ThisBatchResults=data.frame(col1=DependentVariable, col2=Assay.Date, col3=Genotype, col4=Gender)

 results=rbind(results, ThisBatchResults)

 }

 names(results)=c("testV", "Assay.Date", "Genotype", "Gender")

 results$Assay.Date=factor(results$Assay.Date)

 return(results)

}

DependentV1=MockDataSet2(NoAssayDates=300, VariableMean=7.0, VariableSD=1.5, BatchSD=0.5, MaleEffect=1)

DependentV2=MockDataSet2(NoAssayDates=300, VariableMean=6.0, VariableSD=1.3, BatchSD=0.4, MaleEffect=1)

DependentV3=MockDataSet2(NoAssayDates=300, VariableMean=9.0, VariableSD=1.0, BatchSD=0.5, MaleEffect=1)

output=MockDataSet2(NoAssayDates=300, VariableMean=0.02, VariableSD=0.005, BatchSD=0.001, MaleEffect=0.01)

output2=MockDataSet2(NoAssayDates=300, VariableMean=2, VariableSD=0.5, BatchSD=0.005, MaleEffect=0.5)

output3=MockDataSet2(NoAssayDates=300, VariableMean=600, VariableSD=50, BatchSD=5, MaleEffect=100)

output4=MockDataSet2(NoAssayDates=300, VariableMean=200, VariableSD=25, BatchSD=10, MaleEffect=40)

output5=MockDataSet2(NoAssayDates=300, VariableMean=100, VariableSD=20, BatchSD=5, MaleEffect=15)

output6=MockDataSet2(NoAssayDates=300, VariableMean=300, VariableSD=15, BatchSD=5, MaleEffect=50)

output7=MockDataSet2(NoAssayDates=300, VariableMean=50, VariableSD=10, BatchSD=1, MaleEffect=10)

output8=MockDataSet2(NoAssayDates=300, VariableMean=2, VariableSD=0.25, BatchSD=0.05, MaleEffect=0.5)

output9=MockDataSet2(NoAssayDates=300, VariableMean=1, VariableSD=0.04, BatchSD=0.005, MaleEffect=0.5)

output10=MockDataSet2(NoAssayDates=300, VariableMean=40, VariableSD=4, BatchSD=2, MaleEffect=8)

output11=MockDataSet2(NoAssayDates=300, VariableMean=5, VariableSD=0.25, BatchSD=0.1, MaleEffect=0.5)

output12=MockDataSet2(NoAssayDates=300, VariableMean=25, VariableSD=3, BatchSD=1, MaleEffect=3)