

KEVLAR NO SPOOLS GAMMA PRIOR

#####  
##### This program represents the collaborative efforts of Avery Ashby, #####  
##### Ramon Leon, and Jayanth Thyagarajan. This is an inclusive odc file #####  
##### containing the model, data, and initial values. March 20, 2002. #####  
#####

#####  
##### MODEL #####  
#####

model KevlarNoSpoolsGammaPrior;  
{

##### Generation of prior values #####

intercept ~ dnorm(0,0.001) # Intecept prior  
beta.stress ~ dnorm(0,0.001) # Fixed stress effect  
r ~ dgamma(1,0.2) # Shape parameter of Weibull  
# inverse scale parameter that is used by  
# winBUGS parameterization for gamma

#####

##### This loop reads in the data and calculates Weibull scale parameter #####

for(j in 1:M ) { # M is the number of rows in the data (108)  
log(eta[j]) <- intercept + beta.stress \* log(stress[j]) # This is the function for mu in the Weibull  
lambda[j] <- pow(eta[j],-r) # Rescale into lambda parameterization  
} # for use in winBUGS 1.4

##### End of loop #####  
#####

##### This loop gives failure times as exact or censored #####

for(j in 1:M ) {  
t[j] ~ dweib(r,lambda[j])(cen[j],) # Failure times are Weibull or censored  
}

##### End of loop #####  
#####

##### Calculates specified failure quantiles for a given spool #####

eta234 <- exp(intercept + beta.stress \* log(23.4)) # Eta values at 23.4 MPa stress level  
quan234 <- eta234 \* pow((-log(1 - 0.01)),(1/r)) # 1st percentile at 23.4 MPa stress  
lambda234 <- pow(eta234,-r) # Rescale into lambda parameterization  
y.234new ~ dweib(r,lambda234) # Predicted distribution for 23.4 MPa stress  
probability234 <- 1 - exp(-(pow((1000/eta234),r))) # Prob of failure at 1000 hours for each spool

eta225 <- exp(intercept + beta.stress \* log(22.5)) # Eta values at 22.5 MPa stress  
quan225 <- (eta225 \* pow((-log(1 - 0.5)),(1/r))) / 1000 # 50th percentile at 22.5 MPa stress (/ 1000)  
lambda225 <- pow(eta225,-r) # Rescale into lambda parameterization  
y.225new ~ dweib(r,lambda225) # Predicted distribution for 22.5 MPa stress  
probability225 <- 1 - exp(-(pow((1000/eta225),r))) # Prob of failure at 1000 hours for each spool

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