

WinBUGS model file for categorical multilevel model

```
model{
  for(h in 1:H){
    for(k in 1:K){
#likelihood for categorical outcome
      p[h,k]<-expecta[h,k]/sum(expecta[h,1:K])
      expecta[h,k]<-exp(eta[h,k])
      eta[h,k]<- $\alpha$ [1,k]+b2[cod.herd[h],k]+ $\beta$ [1,k]*rod[h]+ $\beta$ [2,k]*sem2[h]+ $\beta$ [3,k]*sem3[h]+ $\beta$ [4,k]*reg2[h]+
         $\beta$ [5,k]*reg3[h]+ $\beta$ [6,k]*reg4[h]+ $\beta$ [7,k]*herdsize[h]+ $\beta$ [8,k]*feed[h]+ $\beta$ [9,k]*sec2[h]+
         $\beta$ [10,k]*sec3[h]+  $\beta$ [11,k]*sec4[h]+ $\beta$ [12,k]*sec5[h]+ $\beta$ [13,k]*num[h]+ $\beta$ [14,k]*age[h]
    }
    sero[h]~dcat(p[h,1:K])
  }
#Priors for intercept
  for(j in 1:1){
     $\alpha$ [j,1]<-0.0
    for(k in 2:K){
       $\alpha$ [j,k]~dnorm(0,0.01)}
  }
#Priors for random cohort effects
  tau1~dgamma(0.5,0.001)
  sig1<-1/sqrt(tau1)
  tau2~dgamma(0.5,0.001)
  sig2<-1/sqrt(tau2)

  for(i in 1:I){
    b2[i,1]<-0.0
    b2[i,2]~dnorm(0,tau1)
    b2[i,3]~dnorm(0,tau2)
  }
#Priors for fixed effects
  for(a in 1:14){
     $\beta$ [a,1]<-0.0
    for(k in 2:K){
       $\beta$ [a,k]~dnorm(0,0.01)}
  }
}
```