Estimation of tulathromycin depletion in plasma and milk after subcutaneous injection in lactating goats using a nonlinear mixed-effects pharmacokinetic modeling approach

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Model code

```
test(){
        deriv(A1 = - (Cl * C) + (Aa * Ka)- (Cl2 * (C - C2))- (CLmilk * C))
        urinecpt(A0 = (Cl * C))
        deriv(Aa = - (Aa * Ka))
        deriv(A2 = (Cl2 * (C - C2)))
        urinecpt(Amilk = (CLmilk * C))
        C = A1 / V
        dosepoint(Aa, idosevar = AaDose, infdosevar = AaInfDose, infratevar = AaInfRate)
        C2 = A2 / V2
        error(CEps = 1)
        observe(CObs = C * (1 + CEps))
        error(CEpsmilk = 1)
        observe(AObsmilk = Amilk * (1 + CEpsmilk))
        stparm(V = tvV * exp(nV))
        stparm(Cl = tvCl * exp(nCl))
        stparm(Ka = tvKa * exp(nKa))
        stparm(V2 = tvV2 * exp(nV2))
        stparm(Cl2 = tvCl2 * exp(nCl2))
        stparm(CLmilk = tvCLmilk * (1+Dosetime*dCLmilkdDosetime) * exp(nCLmilk))
        fcovariate(Dosetime)
        fixef(tvV = c(0, 497438, ))
        fixef(tvCl = c(0, 26580.3, ))
        fixef(tvKa = c(0, 0.22, ))
        fixef(tvV2 = c(0, 692893, ))
```

```
        fixef(tvCl2 = c(0, 10182.6, ))

        fixef(tvCLmilk = c(0, 922.093, ))

        fixef(dCLmilkdDosetime(enable=c(0)) = c(, 0, ))

        ranef(diag(nV, nCl, nKa, nV2, nCl2, nCLmilk) = c(1, 1, 1, 1, 1, 1))

}
```