

FORMULA FOR TRUE ANIMAL PREVALENCE:

$$\pi^A = \frac{p^A + Sp^A - 1}{Se^A + Sp^A - 1},$$

FORMULA FOR TRUE HERD PREVALENCE:

$$\begin{aligned} \pi^H &= \sum_{n_i=0}^{\infty} P(n_i) \left(1 - \prod_{k=0}^{n_i-1} \left[1 - \frac{p^A + Sp^A - 1}{Se^A + Sp^A - 1} + \frac{k(p^A + Sp^A - 1)\rho}{\{1 + (k-1)\rho\}(Se^A + Sp^A - 1)} \right] \right) \\ &= \sum_{n_i=0}^{\infty} P(n_i) \left(1 - \prod_{k=0}^{n_i-1} \left[1 + \frac{(p^A + Sp^A - 1)(\rho - 1)}{(Se^A + Sp^A - 1)\{1 + (k-1)\rho\}} \right] \right). \end{aligned}$$

EXPLANATION OF THE NOTATION USED IN THE ABOVE FORMULA:

n_i = Number of Animals in herd i

z_i = Number of positively tested Animals in herd i

π^A = True Animal Prevalence

π^H = True herd Prevalence

Se = Sensitivity of a single test

Sp = Specificity of a single test

P^A = Apparent Animal Prevalence

P^H = Apparent herd Prevalence

Se^H = Herd Sensitivity

Sp^H = Herd Specificity

ρ = Herd Correlation

k = number of Herds