

VACCRaksha Calc: A computer program for the calculation of vaccine potency

Assessment of vaccine potency is often carried out by veterinarians in animal house in biological units. The more reliable method used for this assessment is Spearman and Karber. The calculations involved in the assessment are complex, confusing, time consuming and not easily reproducible. Spreadsheet is a computer application in which data are arranged in rows and columns of a grid and can be manipulated and used in calculations. In today's era of smart phones, tablet PCs and netbooks, where a spreadsheet program in the form of Microsoft Excel is readily accessible by most veterinarians, it should be possible to adapt the various laborious steps involved in the said method to a spreadsheet program by writing simple logical codes in the spreadsheets to do the calculations in a simple, clear, faster, reproducible, accurate and user-friendly manner. This article describes a spreadsheet program (VACCRaksha Calc) to calculate the vaccine potency based on the steps involved in Spearman and Karber [Figure 1].

Vaccine potency calculation

The spreadsheet program is based on the various steps for evaluation of vaccine potency by Spearman^[1] and Karber^[2] method.

According to them $\log_{10}$ of end point dilution of vaccine is given by the formula

$$- [X_0 - D/2 + D (\Sigma R/N)]$$

Where:

$X_0 = \log_{10}$ of the reciprocal of the lower dilution at which all animals are protected

$D = \log_{10}$ of the dilution factor

$R =$ number of mice died due to specific symptoms

$N =$ number of animals used at each individual dilution (after discounting accidental or nonspecific deaths)

The spreadsheet program used is Microsoft Excel version 2013.^[3]

Coding and logical data used in this program are as follows;

For D11 cell (mice alive)

$$=D9-D10 \text{ (also applied for E, F and G11 cells)}$$

For D13 cell (sum of r/n) it's been,

$$=IF(E12 < 1, D12 + E12 + F12 + G12)$$

For E13 cell,

$$=IF(E12 = 1, E12 + F12 + G12)$$

For D14 cell (multiplication with log of dilution factor)

$$=0.7 * D13$$

For D15 cell (deletion of 0.35)

$$=IF(E12 < 1, D14 - 0.35)$$

For E15 cell (addition of 0.35)

$$=IF(E12 = 1, E14 + 0.35)$$

For Antilog calculation i.e. E15 cell,

$$=IF(E12 < 1, 10^{D15})$$

For D17 cell (relative potency)

$$=IF(E12 < 1, D16/18)$$

One representative study is presented to help and understand the usefulness of the program. The findings of the experiment along with the calculation are presented as a screenshot of the program [Figure 2].

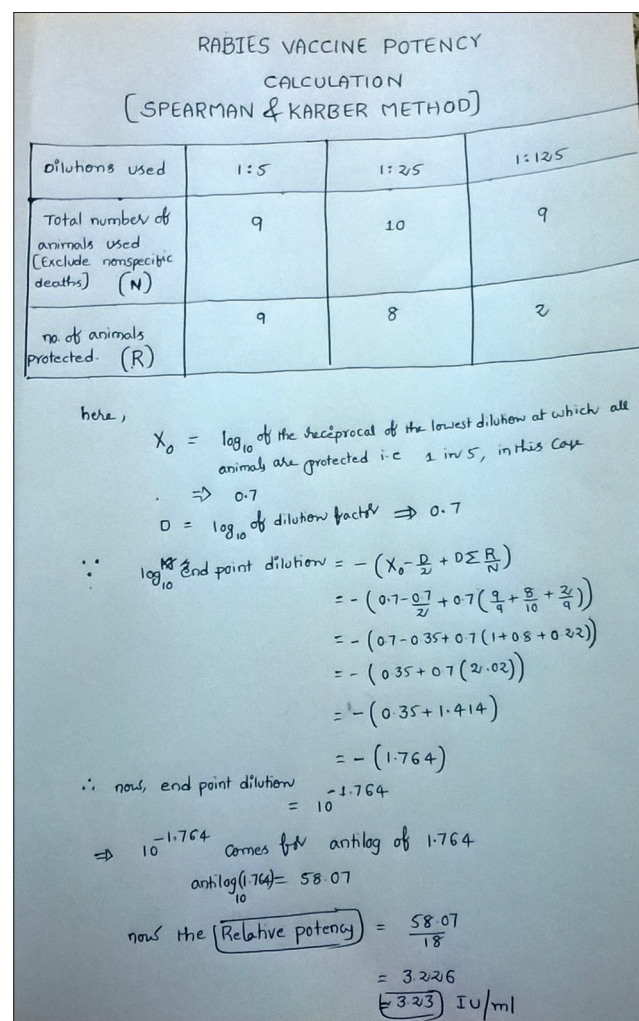


Figure 1: Calculation sheet used in the laboratory (conventional method)

Avula and Avula: A program for vaccine potency

Vaccine potency calculation By Spearman and Karber method									
1. Enter the dilution used:				initial dilution:		1			
2. Enter the dilution factor:				dilution factor:		5			