Adjusted LD_{50}:

Avian LD_{50}:

$$\text{Adj. } LD_{50} = LD_{50} * (AW/TW)^{(x-1)}$$

Mammal LD_{50}:

$$\text{Adj. } LD_{50} = LD_{50} * (TW/AW)^{(0.25)}$$

Mammal NOAEL:

$$\text{Adj. } NOAEL = NOAEL * (TW/AW)^{(0.25)}$$

Where:

$\text{Adj. } LD_{50}$ = adjusted LD_{50}

LD_{50} = acute endpoint reported from bird or mammal study

TW = body weight of tested animal (e.g. 178 g bobwhite, 1580 g mallard, 350 g rat)

AW = body weight of assessed animal (e.g. star=nosed mole, heron, etc.)

x = Mineau scaling factor for birds EFED (default=1.15)

Scaling Factors used in consumption weight EECs:

Avian consumption:

$$F = (0.648 * BW^{0.651})/(1 - W)$$

Mammal consumption:

$$F = (0.621 * BW^{0.564})/(1 - W)$$

where:

F = food intake in grams of fresh weight per day

BW = body mass of animal (avian: 20 g, 100 g, 1000 g; mammal: 15 g, 35 g, 1000 g)

W = mass fraction of water in the food (0.8 for herbivores and insectivores, 0.1 for granivores)

RQ Formulas using upper bound kenaga (EEC (mg/kg-bw)) residues or mean kenaga residues:

EEC dose = upper bound EEC $*$ % (body weight consumed/100)

Avian and Mammalian:

Dose-based:

RQs = EEC equivalent dose/adjusted LD_{50}

Diet-based:

$$\text{Acute } RQs = EEC/LC_{50}$$

$$\text{Chronic } RQs = EEC/NOAEC$$

$LD_{50}ft^{-2}$

Exposure Values

Banded granular applications:

$$\text{mga.i.ft}^{-2} = \frac{\text{application rate} * \%a.i. * 453,590}{\text{no. of rows} * A^{-1} * \text{row length} * \text{bandwidth}}$$

$$\text{Exposed mg a.i. ft}^{-2} = \text{mg a.i. ft}^{-2} * \% \text{ unincorporation}$$

Banded liquid applications:

$$\text{mg a.i. ft}^{-2} = (\text{mg a.i.} 1000\text{ft}^{-1}\text{row})/(1000 \text{ ft} * \text{bandwidth})$$

$$\text{Exposed mg a.i.ft}^{-2} = \text{mg a.i. ft}^{-2} * \% \text{ unincorporation}$$

Broadcast granular applications:

mg a.i. ft^{-2} = (application rate $*$ %a.i. $*$ 453590mg/lb)/43560 $\text{ft}^{-2}\text{acre}^{-1}$

Broadcast liquid applications:

mg a.i. ft^{-2} = (fl oz product $\text{A}^{-1} *$ 28349mg $\text{oz}^{-1} *$ %a.i.)/43560 $\text{ft}^{-2}\text{acre}^{-1}$

$\text{LD}_{50}\text{ft}^{-2}$Calculations:

Avian:

LD_{50} ft^{-2} = (Exposed mg a.i. ft^{-2})/(Adjusted $\text{LD}_{50} * 0.02$)

Mammal:

LD_{50} ft^{-2} = (Exposed mg a.i. ft^{-2})/(Adjusted$\text{LD}_{50} * 0.015$)

Seed Treatments:

Maximum seed application rate (MSAR) (mg a.i./kg seed):

$$\text{MSAR} = (\text{Application rate} * 0.000002)/(100 * 2.2)$$

Where:

$$\text{AR} = \frac{(\text{Application rate (fl oz/cwt)} * \text{decimal \% of a.i. in formulation})}{(128 \text{ fl oz gallon}) * \text{density of product (lbs/gallon)}}$$

$$\text{MAR} = \frac{(\text{Maximum seeding rate * application rate (lbs a.i. cwt)})}{100(\text{lbs/cwt})}$$

MAR = Maximum Application Rate (lbs a.i. /A)

AR = Application Rate (lbs a.i. /cwt)

Avian and Mammalian Nagy Dose (mg a.i./kg-bw):

$$\text{Nagy Dose} = \frac{(\text{Daily food intake (g/day)} * 0.001 * MSAR \text{ (mg/kg-seed)}}{\text{body weight of animal (kg)}}$$

The amount of available pesticide:

$$\text{Available a.i.} = \frac{\text{Maximum application rate (lbs/acre)} * 10^6}{43,560 \text{ (ft}^2\text{/acre)} * 2.2 \text{ (lb/kg)}}$$

Acute and Chronic RQs:

Animal or Mammal:

$$\text{Acute RQ } \sharp 1 = \frac{\text{Nagy Dose}}{\text{Adjusted}LD_{50}}$$

$$\text{Acute RQ } \sharp 2 = \frac{\text{Available a.i.}}{\text{Adjusted}LD_{50} * \text{kg body weight}}$$

$$\text{Chronic RQ} = \frac{\text{Maximum seed application Rate}}{\text{NOAEC}}$$