

Dietary Specialist vs Generalist

Encounter Rates While Searching I_1, I_2 ; Items/ Time

Net Energy Values E_1, E_2

Handling Times h_1, h_2

Hypothesized Currency of Fitness:

Energy Gain/(Search + Handling Time)

Specialist Rate $R_1 >$ Generalist Rate $R_{1,2}$

1. Write rates as inequality

$$\frac{I_1 E_1}{1 + I_1 h_1} > \frac{I_1 E_1 + I_2 E_2}{1 + I_1 h_1 + I_2 h_2}$$

2. “Cross-multiply”

$$I_1 E_1 + I_1^2 h_1 E_1 + I_1 I_2 E_1 h_2 > I_1 E_1 + I_2 E_2 + I_1^2 h_1 E_1 + I_1 I_2 E_2 h_1$$

3. Subtract $(I_1 E_1 + I_1^2 h_1 E_1)$ from each side

$$I_1 I_2 E_1 h_2 > I_2 E_2 + I_1 I_2 E_2 h_1$$

4. Divide by Type-2 Encounter Rate; Note consequence

$$I_1 E_1 h_2 > E_2 + I_1 E_2 h_1$$

5. Divide by E_2 and I_1 ; Note result for $E_1 = E_2$

$$\frac{E_1}{E_2} h_2 > \frac{1}{I_1} + h_1$$

6. Rearrange

$$\frac{1}{I_1} < \frac{E_1}{E_2} h_2 - h_1$$