1 THERMAL LOSSES

$$q_{DP} = K A (T_{MP} - T_{ENV}) = 0,93 \cdot 1,3 \cdot (35 - 20) = 18,1\ W$$

$[\frac{W}{m^2 K}]$ $[m^2]$ $[K]$

$$T_{MP} = \frac{T_{MAX} + T_A}{2} = \frac{60+10}{2} = 35°C$$

$$q_{DD} = 0,93 \cdot 1,3 \cdot (50 - 20) = 36,3\ W$$

$$T_{MD} = \frac{T_{MAX} + T_U}{2} = \frac{60+40}{2} = 50°C$$

2 SIZING EQUATIONS

- $q_S (\tau_P + \tau_D) = m_d c_p (T_U - T_A) + q_{MD} \tau_D + q_{MP} \tau_P + V_S c_p (T_U - T_A)$
- $q_S \tau_P = V_S c_p (T_{MAX} - T_A) + q_{DP} \tau_P$

SI $[W]$ $[h]$ $[s/h]$ $[kg]$ $[\frac{J}{kg K}]$ $[K]$ $[kg]$

$$q_S (1+5) \cdot 3600 = 100 \cdot 4186 (40 - 10) + 36,3 \cdot 1 \cdot 3600 + 18,1 \cdot 5 \cdot 3600 + V_S \cdot 4186 (40-10)$$

$$q_S \cdot 5 \cdot 3600 = V_S \cdot 4186 (60 - 10) + 18,1 \cdot 5 \cdot 3600$$

T.U. $[\frac{kcal}{h}]$ $[h]$ $[L]$ $[\frac{kcal}{kg °C}]$ $[°C]$ $[\frac{kcal}{h}]$ $[1]$

$$q_S (1+5) = 100 \cdot 1 (40-10) + 36,3 \cdot 1 + 18,1 \cdot 5 + V_S \cdot 1 \cdot (40-10)$$

$$q_S \cdot 5 = V_S \cdot 1 (60-10) + 18,1 \cdot 5$$

3 SOLUTION

1. With Losses $V_S = 100,5\ kg$ $q_S = 1021\ \frac{kcal}{h} = 1187\ W$
2. Without Losses $V_S = 100\ kg$ $q_S = 1000\ \frac{kcal}{h} = 1163\ W$