Sim Brewer (working title) development notes

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Rate of change of protein content during mashing

$$dX_L = \left(-\epsilon_L X_L e^{-\left(\frac{(T - T_{L,opt})}{\sigma_{T,L}} \right)^2} + \sigma_L G_L \right) dt \tag{1}$$

$$dX_M = \left(\epsilon_L X_L e^{-\left(\frac{(T - T_{L,opt})}{\sigma_{T,L}} \right)^2} - \epsilon_M X_M e^{-\left(\frac{(T - T_{M,opt})}{\sigma_{T,M}} \right)^2} + \sigma_M G_M \right) dt \tag{2}$$

$$dX_S = \left(\epsilon_M X_M e^{-\left(\frac{(T - T_{M,opt})}{\sigma_{T,M}} \right)^2} + \sigma_S G_S \right) dt \tag{3}$$

Rate of change of sugar content during mashing

$$dX_m = \left(\epsilon_m G_m e^{-\left(\frac{(T - T_{m,opt})}{\sigma_{T,m}} \right)^2} \right) dt \tag{4}$$

Table 1: Protein Conversion Glossary

X_L	long protein quantity
ϵ_L	long protein enzymatic efficiency
T	Temperature
$T_{L,opt}$	optimum temperature for long protein enzymatic breakdown
$\sigma_{T,L}$	long protein enzyme temperature tolerance
σ_L	long protein soluability rate
G_L	long protein content in grain
t	time
X_M	medium protein quantity
ϵ_M	medium protein enzymatic efficiency
$T_{M,opt}$	optimum temperature for medium protein enzymatic breakdown
$\sigma_{T,M}$	medium protein enzyme temperature tolerance
σ_M	medium protein soluability rate
G_M	medium protein content in grain
X_S	small protein quantity
ϵ_S	small protein enzymatic efficiency
$T_{S,opt}$	optimum temperature for small protein enzymatic breakdown
$\sigma_{T,S}$	small protein enzyme temperature tolerance
σ_S	small protein soluability rate
G_S	small protein content in grain

Table 2: Protein Conversion Glossary

X_m	maltose quantity
ϵ_m	maltose enzymatic efficiency
T	Temperature
$T_{m,opt}$	optimum temperature for enzymatic breakdown of starch into maltose
$\sigma_{T,m}$	maltose enzyme temperature tolerance
G_m	maltose content in grain
t	time