$$\pi_t\left(l,\sigma^2,y^*,y^\delta\right)\propto\left[y^*,y^\delta\middle|y,l,\sigma^2\right]\left[y\middle|l,\sigma^2\right]\left[l,\sigma^2\right]\prod_{p=1}^{N}\Phi\left(\tau_t y^{\delta(p)}\right)$$

$$\frac{\pi_0\left(l^{new},\sigma^{2(i)},y^{*(i)},y^{\delta(i)}\right)}{\pi_0\left(l^{(i)},\sigma^{2(i)},y^{*(i)},y^{\delta(i)}\right)}\frac{\pi_0\left(l^{(i)},\sigma^{2,new},y^{*(i)},y^{\delta(i)}\right)}{\pi_0\left(l^{(i)},\sigma^{2(i)},y^{*(i)},y^{\delta(i)}\right)}$$

$$\mu_i=\begin{bmatrix} K^{00}\left(X^*,X\right) \\ K^{\bullet 0}\left(X^\delta,X\right) \end{bmatrix}K^{00}\left(X,X\right)^{-1}y$$

$$\tau^2{}_i=\begin{bmatrix} K^{00}\left(X^*,X^*\right) & K^{\bullet 0}\left(X^\delta,X^*\right)^T \\ K^{\bullet 0}\left(X^\delta,X^*\right) & K^{\bullet\bullet}\left(X^\delta,X^\delta\right) \end{bmatrix}$$

$$\frac{\prod_{p=1}^{N}\Phi\left(\tau_t y^{\delta(p)}\right)}{\prod_{p=1}^{N}\Phi\left(\tau_{t-1} y^{\delta(p)}\right)}$$

$$\frac{\pi_t\left(l^{new},\sigma^{2(i)}{}_t,y^{*(i)}{}_t,y^{\delta(i)}{}_t\right)}{\pi_t\left(l^{(i)},\sigma^{2(i)}{}_t,y^{*(i)}{}_t,y^{\delta(i)}{}_t\right)}\frac{\pi_t\left(l^{(i)}{}_t,\sigma^{2,new},y^{*(i)}{}_t,y^{\delta(i)}{}_t\right)}{\pi_t\left(l^{(i)}{}_t,\sigma^{2(i)},y^{*(i)}{}_t,y^{\delta(i)}{}_t\right)}$$

$$\frac{\pi_t\left(l^{(i)}{}_t,\sigma^{2(i)},y^{*new},y^{\delta new}\right)}{\pi_t\left(l^{(i)}{}_t,\sigma^{2(i)},y^{*(i)}{}_t,y^{\delta(i)}{}_t\right)}$$

$$q_t=\begin{bmatrix} \hat{\mathrm{v}}\mathrm{ar}\left(\left(\left[l\right]_1\right)_1^{1:N}\right) & 0 \\ 0 & \hat{\mathrm{v}}\mathrm{ar}\left(\left(\left[l\right]_2\right)_1^{1:N}\right) \end{bmatrix}$$

$$t\le\left\lceil\frac{M}{3}\right\rceil$$