Appendix

Calculation of the sample size formula

When combining (6) and (7) and replacing $\Delta_j^2|r_j$ by it's expectation, the following calculations lead to the overall sample size formula (9).

$$
\begin{aligned}
&(q_{1-\alpha/2} + q_{1-\beta})^2 = \frac{\mu^2}{\mathrm{Var}(\mu)} \\
\Longleftrightarrow &N^2 - N\frac{\sigma^2(k+1)^2}{k}\left(\frac{q_{1-\alpha/2} + q_{1-\beta}}{\mu}\right)^2 \\
&= \tau^2(k+1)^2\sum_{j=1}^{c}\mathrm{E}\left(\Delta_j^2|r_j\right)\left(\frac{q_{1-\alpha/2} + q_{1-\beta}}{\mu}\right)^2
\end{aligned}
$$

This quadratic equation can be solved with standard algebra techniques and leads to the following result

$$
\begin{aligned}
&N_{1,2} = \frac{\sigma^2(k+1)^2}{2k}\left(\frac{q_{1-\alpha/2} + q_{1-\beta}}{\mu}\right)^2 \\
\pm&\sqrt{\frac{\sigma^4(k+1)^4}{4k^2} + \frac{\tau^2(k+1)^2\mu^2\sum_{j=1}^{c}\mathrm{E}\left(\Delta_j^2|r_j\right)}{\left(q_{1-\alpha/2} + q_{1-\beta}\right)^2}} \\
&\cdot\left(\frac{q_{1-\alpha/2} + q_{1-\beta}}{\mu}\right)^2.
\end{aligned}
$$

Since we are interested in positive integers, we take the positive solution from above. $\square$