1. **Second Derivative $u''(w)$**:

$$u''(w) = \frac{d}{dw}\left(w^{-\gamma}\right) = -\gamma w^{-\gamma-1}$$

   Evaluated at $w = \mu$:

$$u''(\mu) = -\gamma\mu^{-\gamma-1}$$

2. **Taylor Series Approximation**:

   Substituting these derivatives into the Taylor series expansion:

$$u(w) \approx \frac{\mu^{1-\gamma}}{1-\gamma} + \mu^{-\gamma}(w-\mu) + \frac{1}{2}(-\gamma\mu^{-\gamma-1})(w-\mu)^2$$

3. **Expected Utility**:

   The expected utility, considering $w$ is normally distributed $w \sim N(\mu, \sigma^2)$, is:

$$\mathbb{E}[u(w)] \approx \frac{\mu^{1-\gamma}}{1-\gamma} + \mu^{-\gamma}\mathbb{E}[w-\mu] + \frac{1}{2}(-\gamma\mu^{-\gamma-1})\mathbb{E}[(w-\mu)^2]$$

   Since $\mathbb{E}[w-\mu] = 0$ and $\mathbb{E}[(w-\mu)^2] = \sigma^2$, this simplifies to:

$$\mathbb{E}[u(w)] \approx \frac{\mu^{1-\gamma}}{1-\gamma} - \frac{1}{2}\gamma\mu^{-\gamma-1}\sigma^2$$

Thus, the second-order Taylor series approximation of the expected CRRA utility function is:

$$\mathbb{E}[u(w)] \approx \frac{\mu^{1-\gamma}}{1-\gamma} - \frac{1}{2}\gamma\mu^{-\gamma-1}\sigma^2$$

This result shows how the expected utility is reduced by the variability (risk) in wealth $\sigma^2$, with the degree of risk aversion $\gamma$ playing a crucial role in this reduction.