$$\lim_{\rho_1,\rho_2\to\infty} \beta_n' = \sum_{j=0}^{n} \frac{a^j q^{j^2}}{(q)_{n-j}} \beta_j$$

Hence by Bailey's lemma,

$$\sum_{j=0}^{n} \frac{a^j q^{j^2}}{(q)_{n-j}} \beta_j = \sum_{r=0}^{n} \frac{a^r q^{r^2} \alpha_r}{(q)_{n-r} (aq)_{n+r}}$$

Letting $n\to\infty$ (& assuming certain convergence conditions)

$$\frac{1}{(q)_\infty} \sum_{j=0}^{\infty} a^j q^{j^2} \beta_j = \sum_{r=0}^{\infty} \frac{a^r q^{r^2} \alpha_r}{(q)_\infty (aq)_\infty}$$

and

$$\sum_{j=0}^{\infty} a^j q^{j^2} \beta_j = \frac{1}{(aq)_\infty} \sum_{r=0}^{\infty} a^r q^{r^2} \alpha_r .$$

<u>**Cor**</u> If (α_n, β_n) is a Bailey pair then

(α_n', β_n') is a Bailey pair

where

$$\alpha_n' = a^n q^{n^2} \alpha_n$$

$$\beta_n' = \sum_{j=0}^{n} \frac{a^j q^{j^2} \beta_j}{(q)_{n-j}} .$$