Let t be total number of discs and b be total blue discs. We want:

$$\frac{b}{t} \cdot \frac{b-1}{t-1} = \frac{1}{2}$$
$$\Longrightarrow (2t-1)^2 - 2(2b-1)^2 = -1$$
$$\Longrightarrow y^2 - 2x^2 = -1 \quad \{\text{let}\}$$

Which is a form of Pell's Equation. We can see that $(1,1)$ satisfies the equation. To get further solutions, let $(p, q) = (1,1)$ denote the first solution. Then

$$2x^2 - y^2 = (2p^2 - q^2)^n = 1$$
$$\Longrightarrow \left(\sqrt{2}x - y\right)\left(\sqrt{2}x + y\right) = \left(\sqrt{2}p - q\right)^n \left(\sqrt{2}p + q\right)^n = 1$$
$$\Longrightarrow [x, y] = \left[\frac{\left(\sqrt{2}p + q\right)^n - \left(\sqrt{2}p - q\right)^n}{2\sqrt{2}}, \frac{\left(\sqrt{2}p + q\right)^n + \left(\sqrt{2}p - q\right)^n}{2}\right]$$

Least n for which $y > 2 \times 10^{12} - 1 \Longrightarrow t > 10^{12}$ is $n = 33$.

For $n = 33$, we get $b = 756872327473$.