Breeding programs available for the generation of a homozygous double transgenic line

First Intercross

First cross with two homozygous transgenic lines Tg(a) and Tg(b)

$X^{Tg(a)/Tg(a)}$ x $X^{Tg(b)/Tg(b)}$

	$X^{Tg(a)}$	$X^{Tg(a)}$
X^{Wt}	$X^{Tg(a)}/X^{Wt}$	$X^{Tg(a)}/X^{Wt}$
X^{Wt}	$X^{Tg(a)}/X^{Wt}$	$X^{Tg(a)}/X^{Wt}$

	X^{Wt}	X^{Wt}
$X^{Tg(b)}$	$X^{Tg(b)}/X^{Wt}$	$X^{Tg(b)}/X^{Wt}$
$X^{Tg(b)}$	$X^{Tg(b)}/X^{Wt}$	$X^{Tg(b)}/X^{Wt}$

Percentage distribution of offspring from first cross

100% = $X^{Tg(a)/Wt,Tg(b)/Wt}$

First Backcross

$X^{Tg(a)/Wt,Tg(b)/Wt}$ x $X^{Tg(a)/Tg(a)}$

	$X^{Tg(a)}$	X^{Wt}
$X^{Tg(a)}$	$X^{Tg(a)}/X^{Tg(a)}$	$X^{Tg(a)}/X^{Wt}$
$X^{Tg(a)}$	$X^{Tg(a)}/X^{Tg(a)}$	$X^{Tg(a)}/X^{Wt}$

	$X^{Tg(b)}$	X^{Wt}
X^{Wt}	$X^{Tg(b)}/X^{Wt}$	X^{Wt}/X^{Wt}
X^{Wt}	$X^{Tg(b)}/X^{Wt}$	X^{Wt}/X^{Wt}

25% $X^{Tg(a)/Tg(a),\ Tg(b)/Wt}$

25% $X^{Tg(a)/Tg(a),\ Wt}$

25% $X^{Tg(a)/Wt,Tg(b)/Wt}$

25% $X^{Tg(a)/Wt,\ Wt}$

Second Intercross

$X^{Tg(a)/Tg(a),Tg(b)/Wt}$ x $X^{Tg(a)/Tg(a),Tg(b)/Wt}$

	$X^{Tg(a)}$	$X^{Tg(a)}$
$X^{Tg(a)}$	$X^{Tg(a)}/X^{Tg(a)}$	$X^{Tg(a)}/X^{Tg(a)}$
$X^{Tg(a)}$	$X^{Tg(a)}/X^{Tg(a)}$	$X^{Tg(a)}/X^{Tg(a)}$

	$X^{Tg(b)}$	X^{Wt}
$X^{Tg(b)}$	$X^{Tg(b)}/X^{Tg(b)}$	$X^{Tg(b)}/X^{Wt}$
X^{Wt}	$X^{Tg(b)}/X^{Wt}$	X^{Wt}/X^{Wt}

25% $X^{Tg(a)/Tg(a),\ Tg(b)/Tg(b)}$

50% $X^{Tg(a)/Tg(a),\ Tg(b)/Wt}$

25% $X^{Tg(a)/Tg(a),\ Wt}$

Second Intercross

$X^{Tg(a)/Wt,Tg(b)/Wt}$ x $X^{Tg(a)/Wt,Tg(b)/Wt}$

	$X^{Tg(a)}$	X^{Wt}
$X^{Tg(a)}$	$X^{Tg(a)}/X^{Tg(a)}$	$X^{Tg(a)}/X^{Wt}$
X^{Wt}	$X^{Tg(a)}/X^{Wt}$	X^{Wt}/X^{Wt}

	$X^{Tg(b)}$	X^{Wt}
$X^{Tg(b)}$	$X^{Tg(b)}/X^{Tg(b)}$	$X^{Tg(b)}/X^{Wt}$
X^{Wt}	$X^{Tg(b)}/X^{Wt}$	X^{Wt}/X^{Wt}

6.25% $X^{Tg(a)/Tg(a),\ Tg(b)/Tg(b)}$

12.5% $X^{Tg(a)/Tg(a),\ Tg(b)/Wt}$

6.25% $X^{Tg(a)/Tg(a),\ Wt}$

12.5% $X^{Tg(a)/Wt,\ Tg(b)/Tg(b)}$

25% $X^{Tg(a)/Wt,\ Tg(b)/Wt}$

12.5% $X^{Tg(a)/Wt,\ Wt}$

6.5% $X^{Wt,\ Tg(b)/Tg(b)}$

12.5% $X^{Wt,\ Tg(b)/Wt}$

6.5% $X^{Wt,\ Wt}$

The minimum number of animals required to produce a single breeding pair will be;
Intercross x Intercross = 32
Intercross x Backcross x Intercross = 16

The IxBxI strategy results in a 50% reduction in not only animals required but also genotyping, helping to reduce costs.

The IxBxI strategy will also assist in confirming the potential for double homozygous lethality more quickly.