□ Simple decomposition of u_i of animal i:

$$u_i = \frac{1}{2} u_s + \frac{1}{2} u_d + m_i$$

where u_s : breeding value of parent s } of i

u_d : " " " " d

m_i : ~~nad~~ mendelian sampling term.

$$
\begin{aligned}
u_1 &= && m_1 \\
u_2 &= && m_2 \\
u_3 &= && m_3 \\
u_4 &= \tfrac{1}{2} u_1 + \tfrac{1}{2} u_2 + && m_4 \\
u_5 &= \tfrac{1}{2} u_3 + \tfrac{1}{2} u_2 + && m_5 \\
u_6 &= \tfrac{1}{2} u_4 + \tfrac{1}{2} u_5 + && m_6
\end{aligned}
$$

$$u = P \cdot u + m$$

$$
\begin{pmatrix} u_1 \\ u_2 \\ u_3 \\ u_4 \\ u_5 \\ u_6 \end{pmatrix}
=
\begin{pmatrix}
0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 \\
\tfrac{1}{2} & \tfrac{1}{2} & 0 & 0 & 0 & 0 \\
0 & \tfrac{1}{2} & \tfrac{1}{2} & 0 & 0 & 0 \\
0 & 0 & 0 & \tfrac{1}{2} & \tfrac{1}{2} & 0
\end{pmatrix}
\begin{pmatrix} u_1 \\ u_2 \\ u_3 \\ u_4 \\ u_5 \\ u_6 \end{pmatrix}
+ m
$$