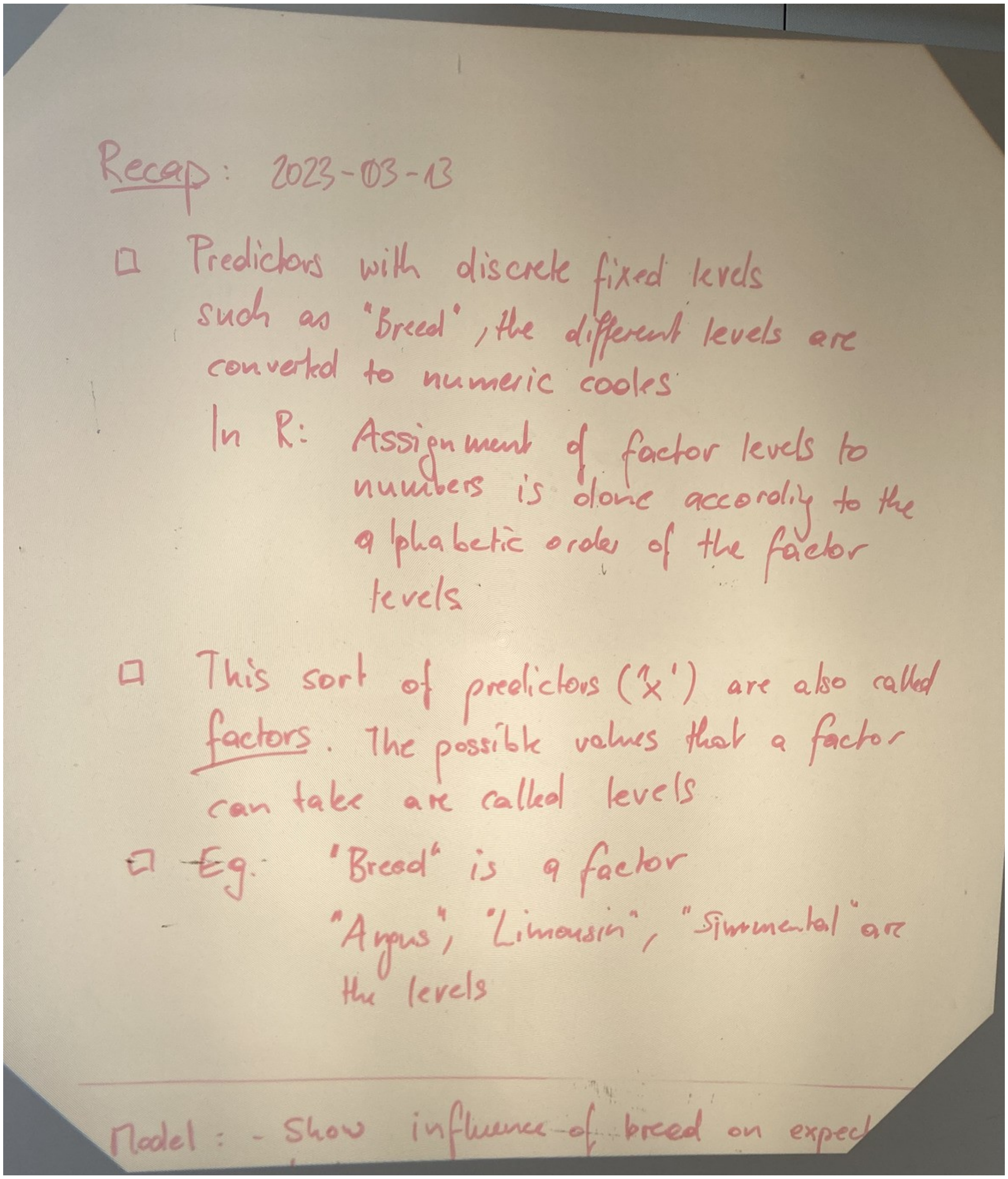
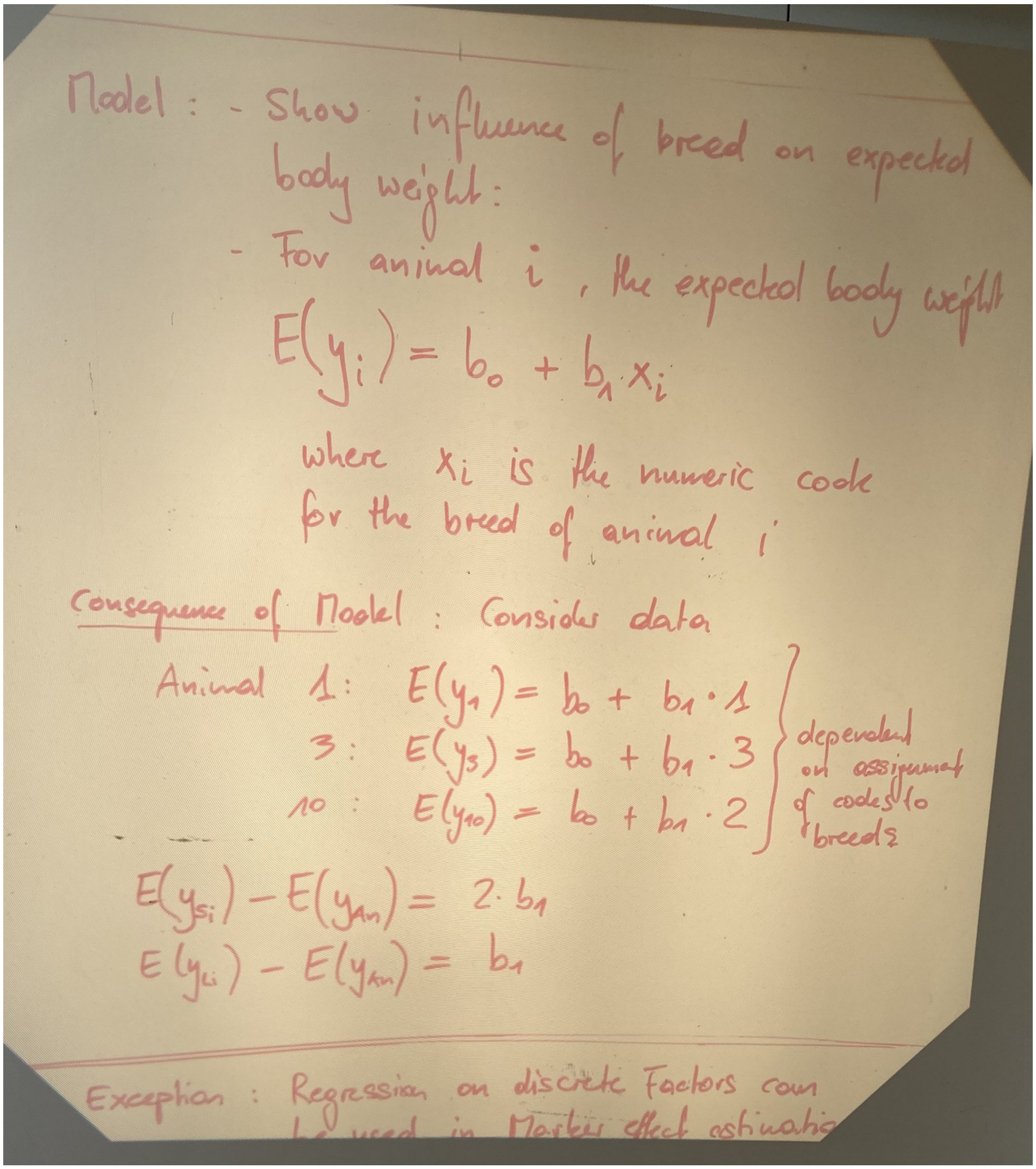
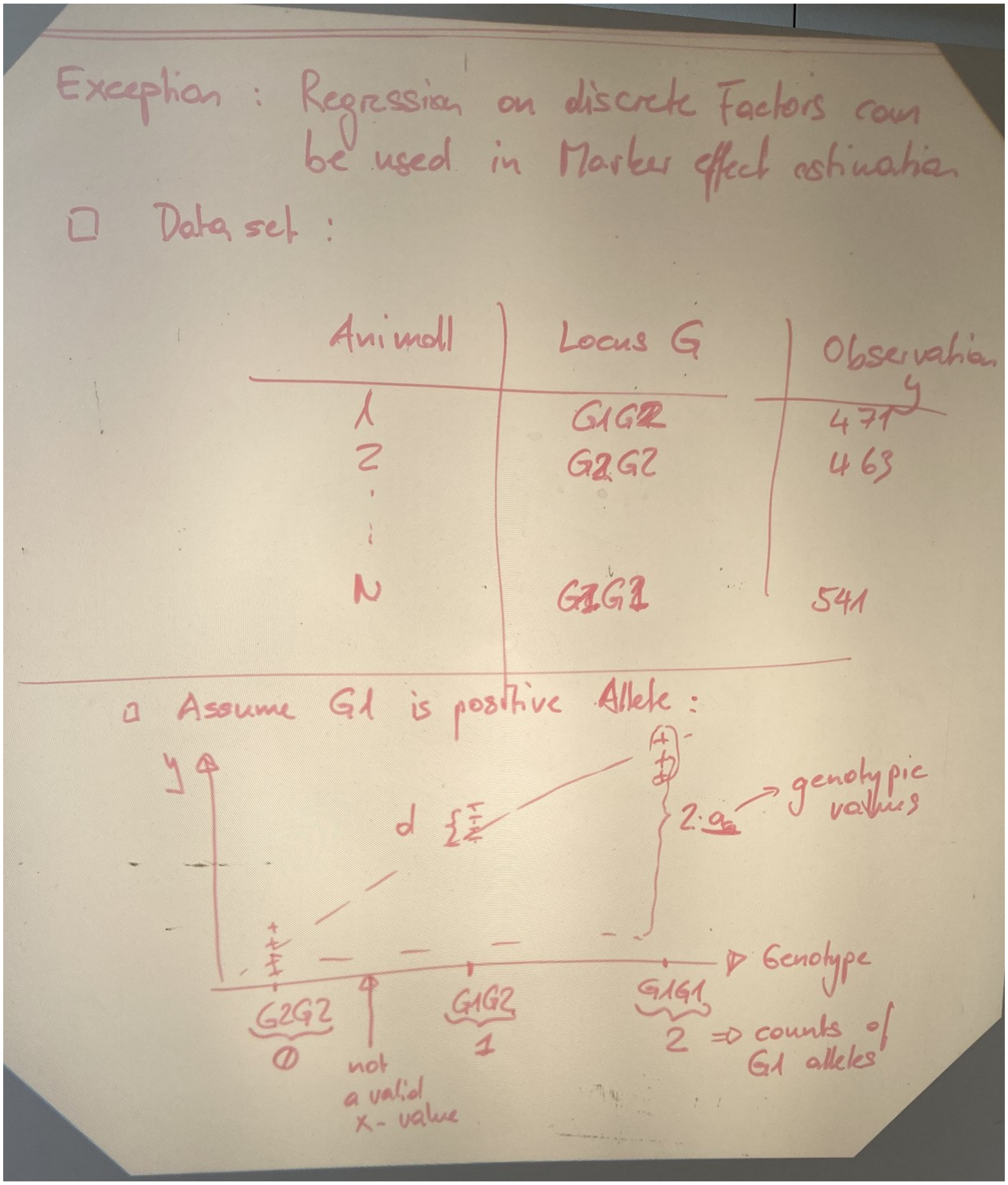
**OHP Picture 1**



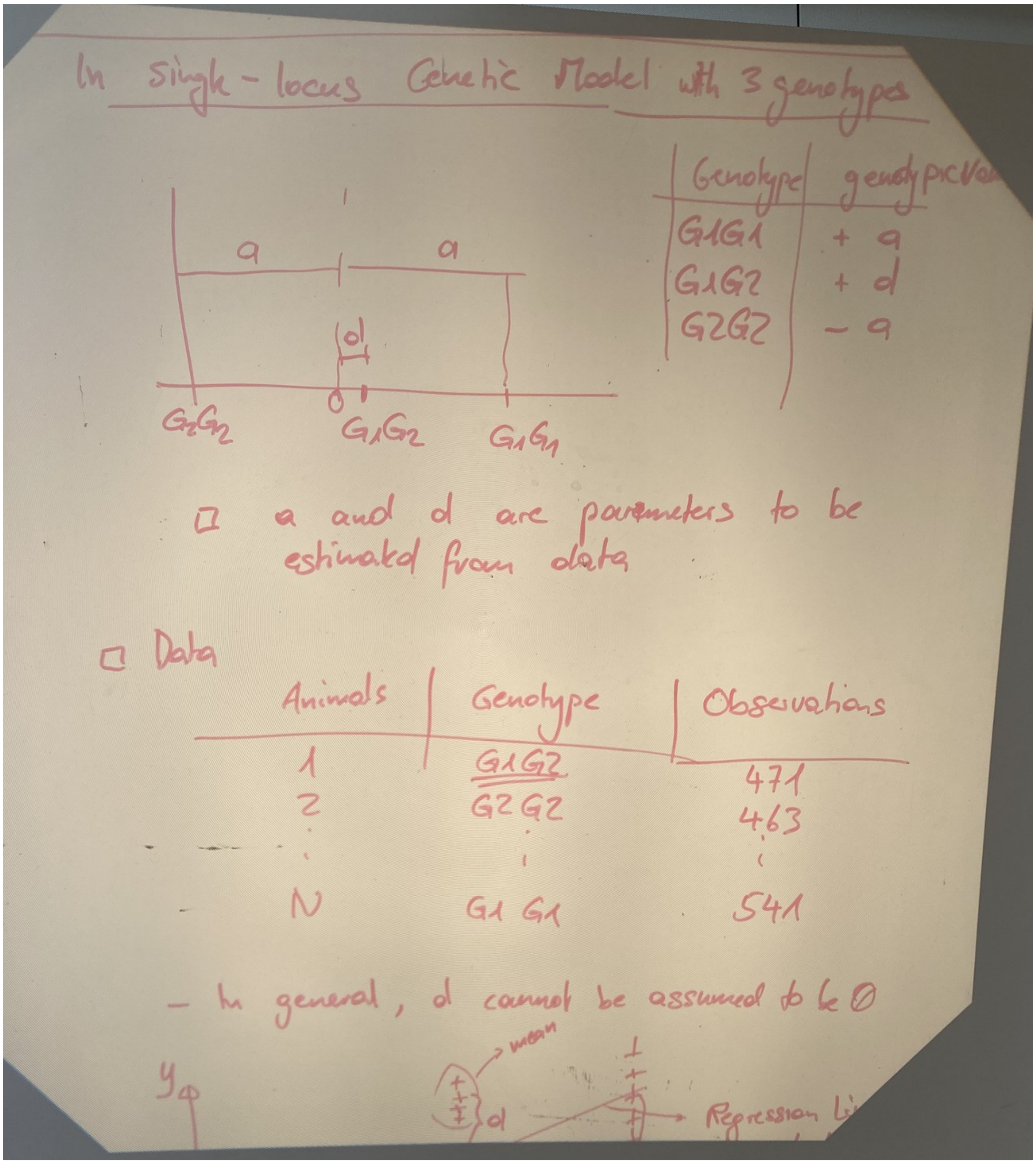
**OHP Picture 2**



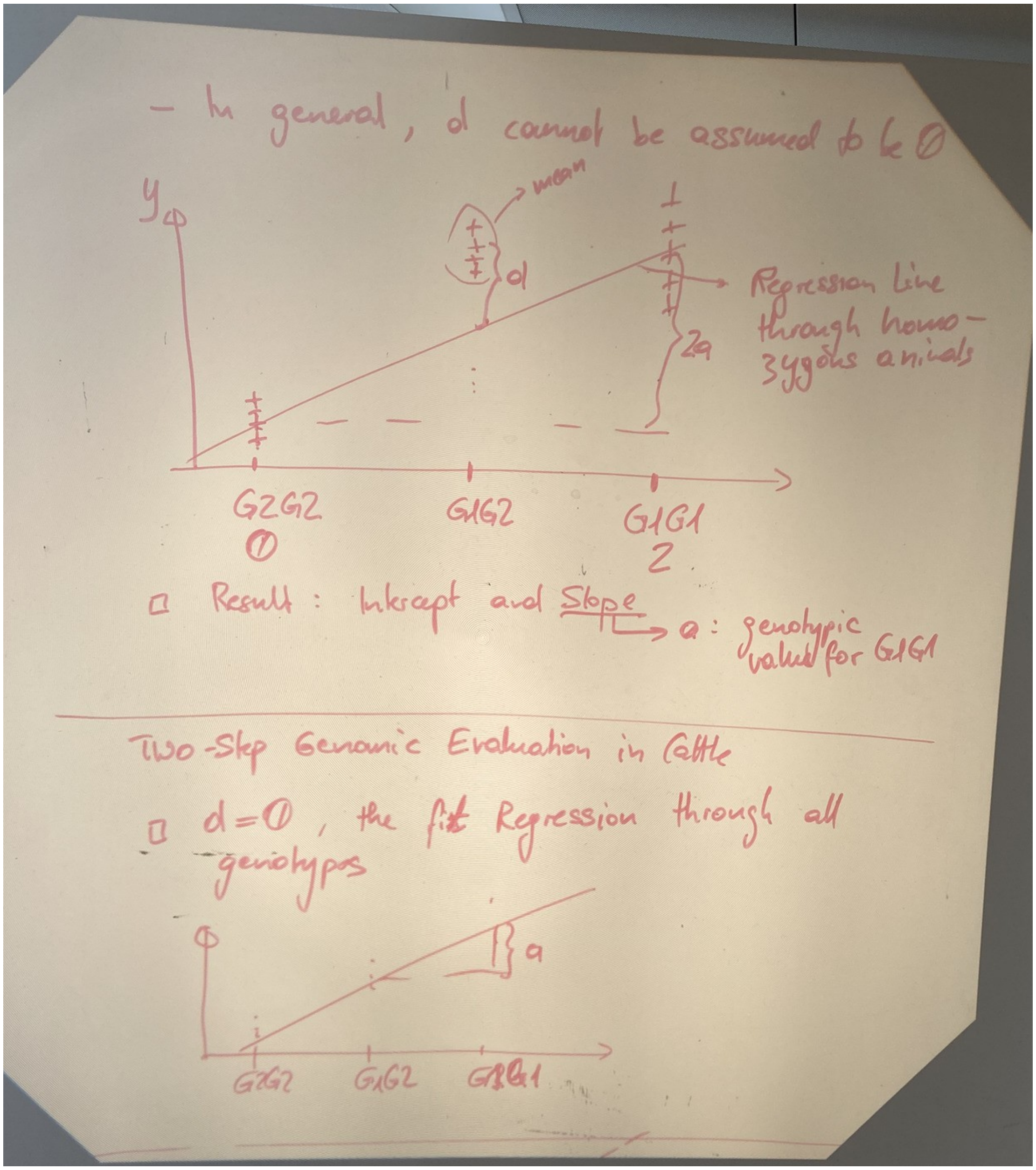
**OHP Picture 3**



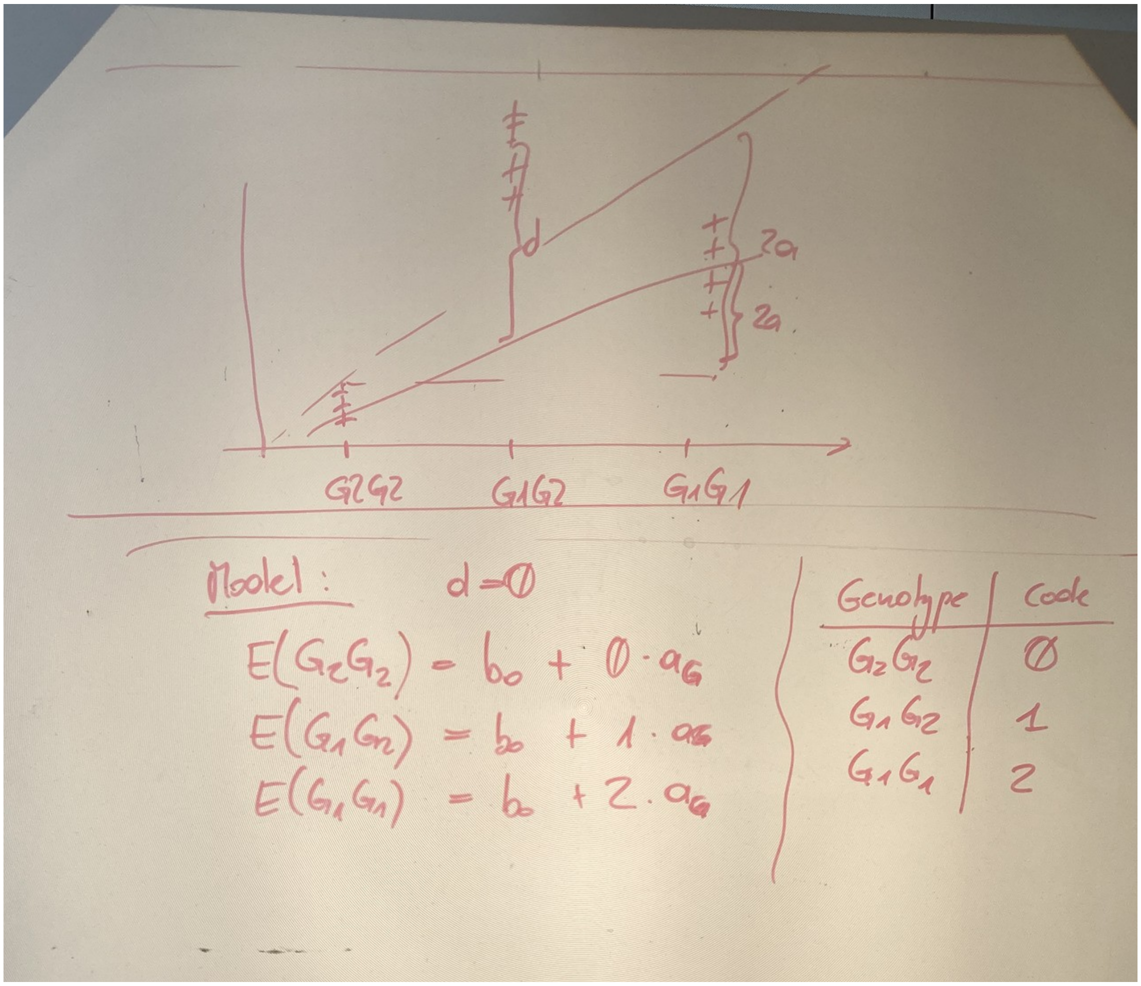
**OHP Picture 4**



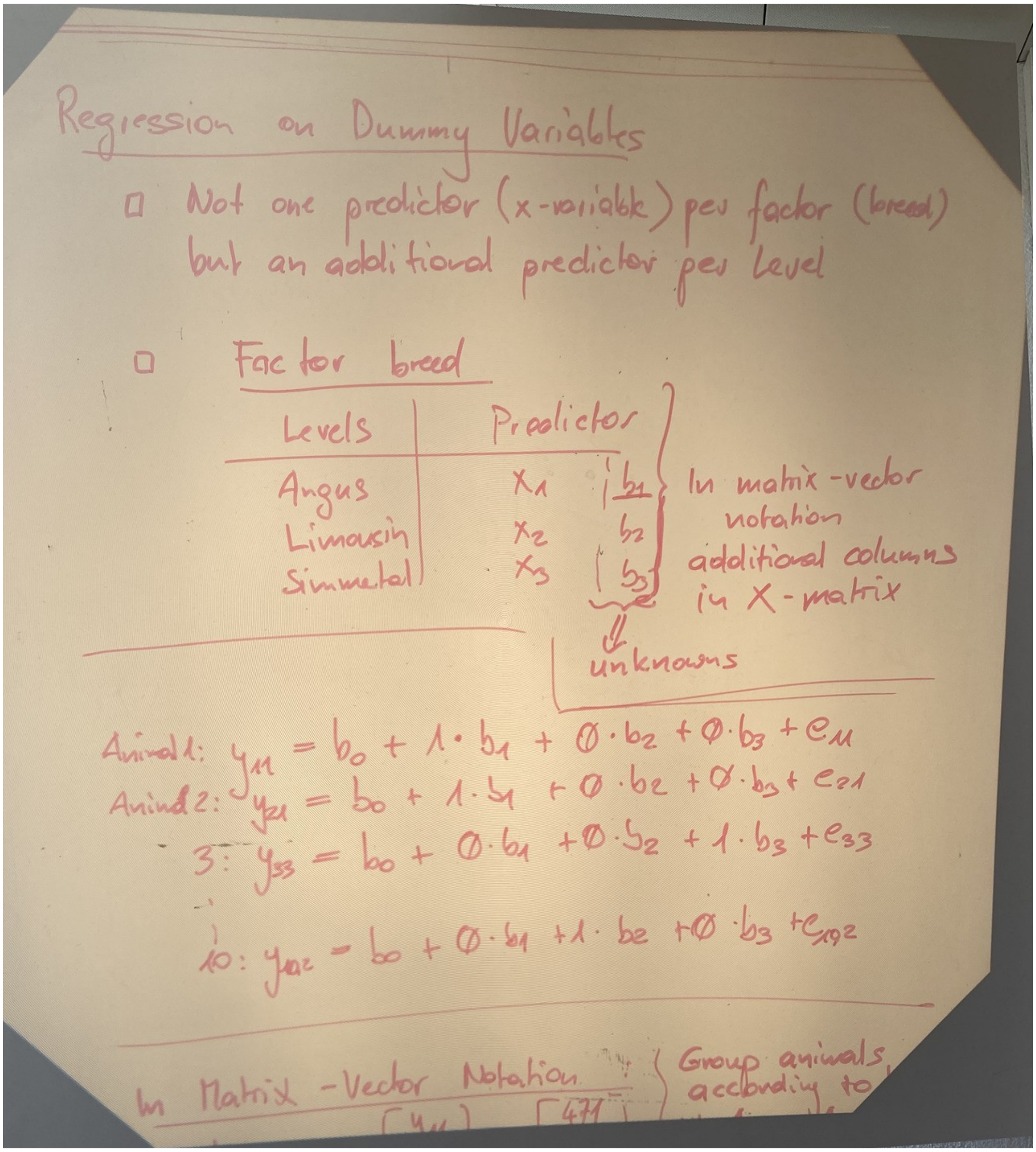
**OHP Picture 5**



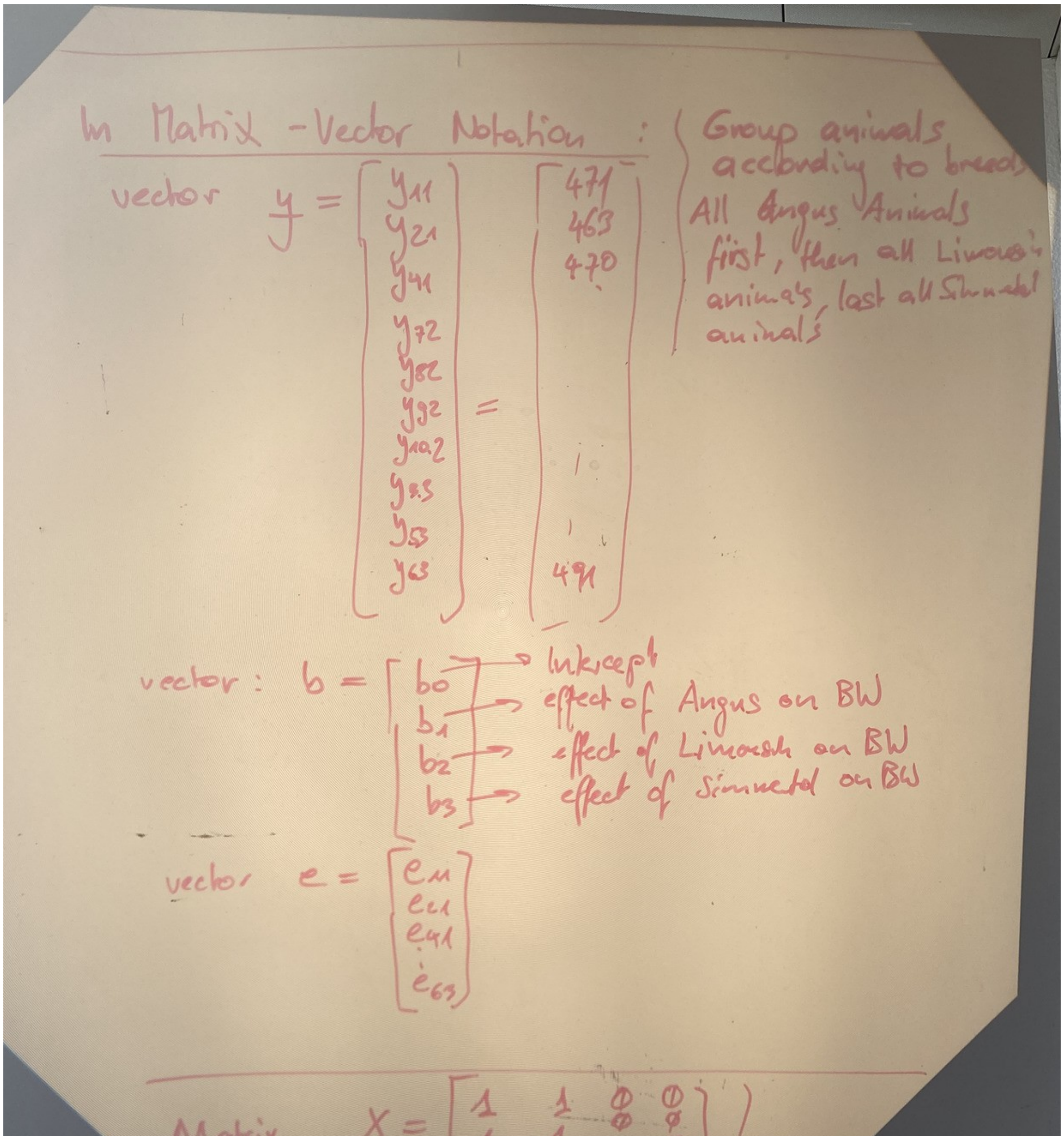
**OHP Picture 6**



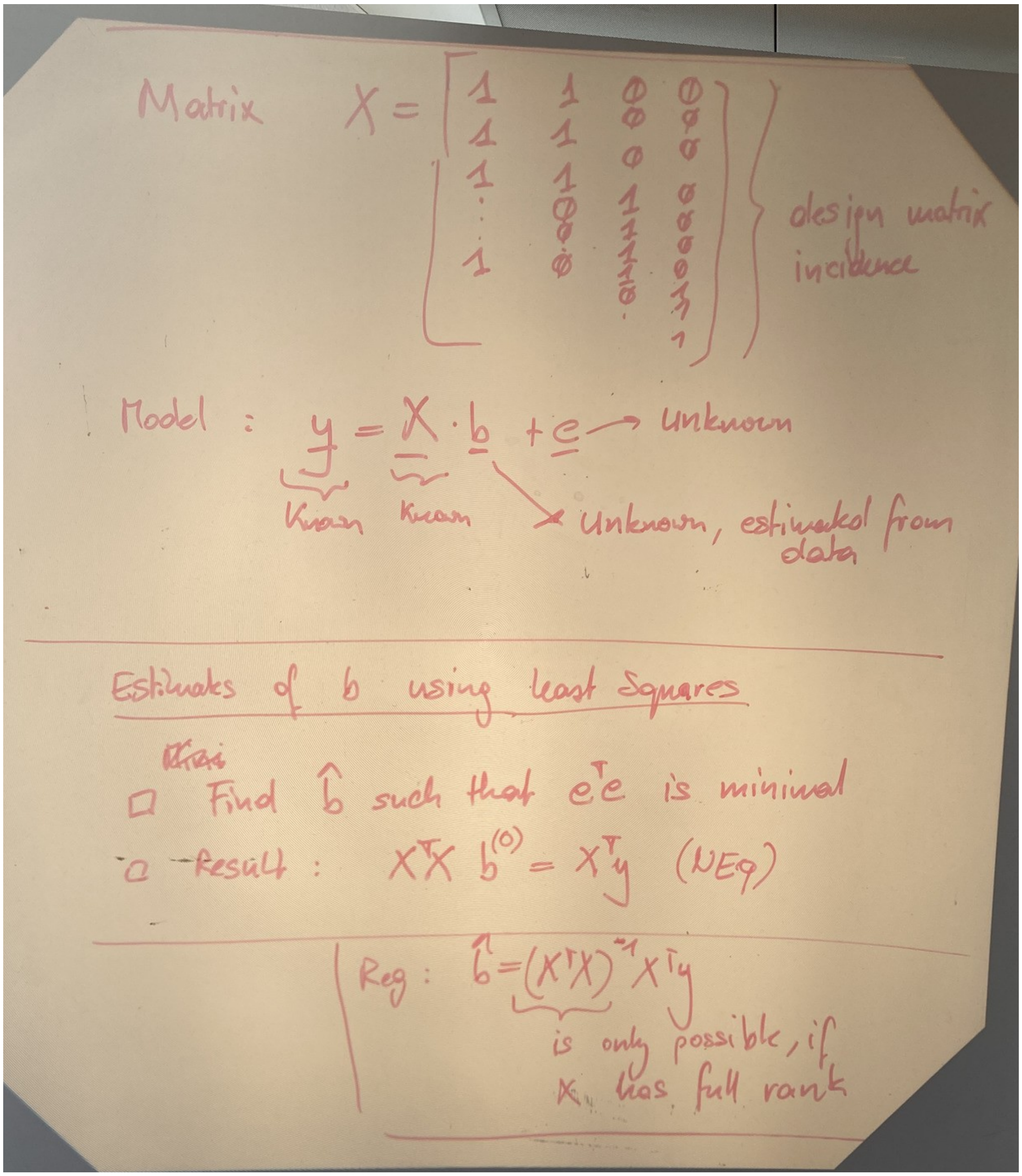
**OHP Picture 7**



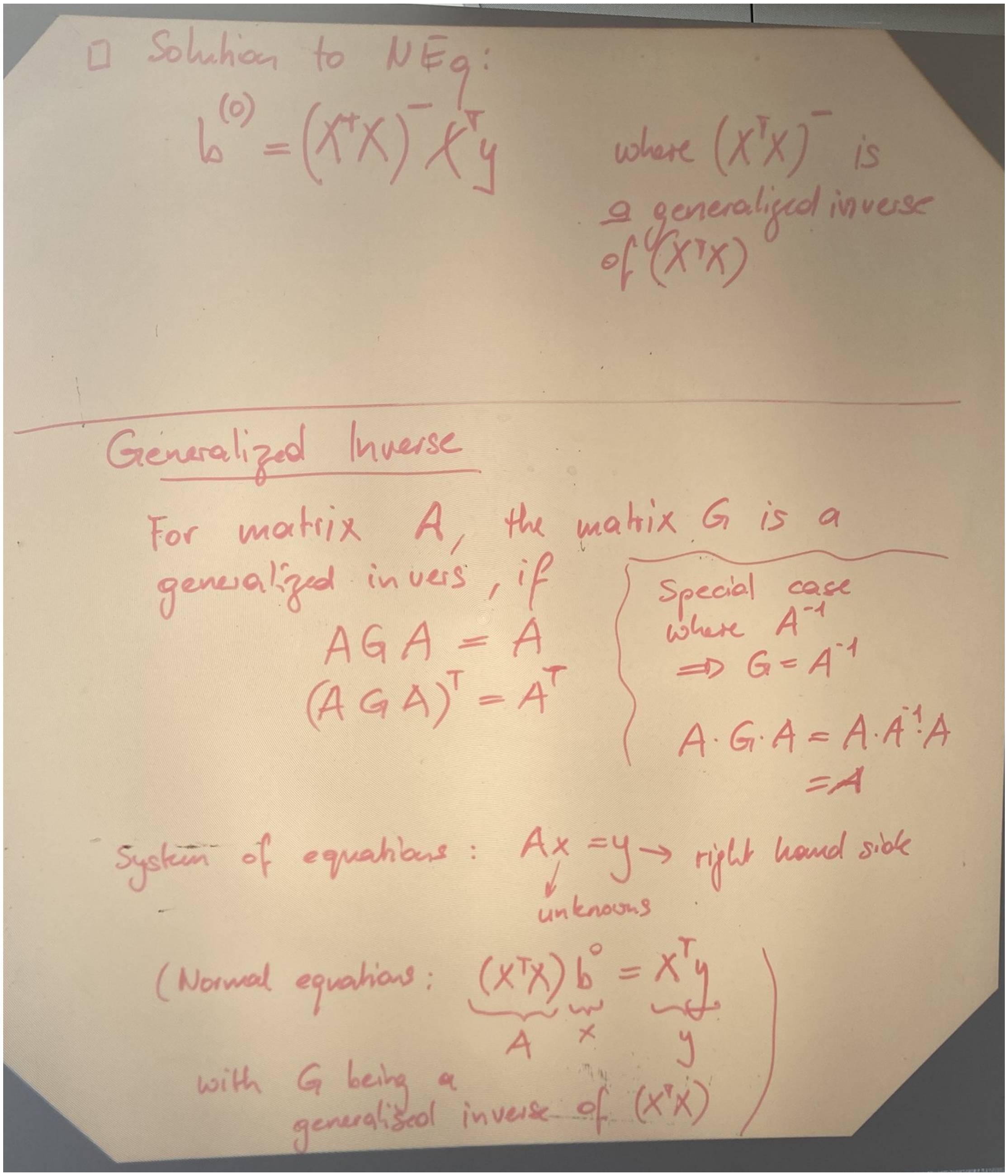
**OHP Picture 8**



## OHP Picture 9



**OHP Picture 10**



□ Solution to NEq:

$$b^{(0)} = (X^TX)^- X^T y$$

where $(X^TX)^-$ is a generalized inverse of $(X^TX)$

Generalized Inverse

For matrix $A$, the matrix $G$ is a generalized invers, if

$$AGA = A$$
$$(AGA)^T = A^T$$

Special case where $A^{-1}$
$\Rightarrow G = A^{-1}$

$$A \cdot G \cdot A = A \cdot A^{-1} \cdot A = A$$

System of equations: $Ax = y \rightarrow$ right hand side

unknowns

(Normal equations: $\underbrace{(X^TX)}_{A} \underbrace{b^0}_{x} = \underbrace{X^Ty}_{y}$

with $G$ being a generalized inverse of $(X^TX)$)

**OHP Picture 11**

For $Ax = y$ with $G$ being a generalized inverse of $A \Leftrightarrow AGA = A$

$x = Gy$ is a solution of $Ax = y$.

Pre-multiply with $\Rightarrow Ax = AGy$

replace $y$ with $Ax \Rightarrow Ax = \underbrace{AGA}_{= A}x$

Normal equations : $(X^TX)b^0 = X^Ty$

$G$ being a generalized inverse of $(X^TX)$

$\Rightarrow b^0 = GX^Ty$