# Pesek-Baker Index

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## 1  Definition

The Pesek Baker (Pesek and Baker, 1969) is an index where relative economic weights have been replaced by desired gains, a form of economic weight that could be more easily specify by the breeders. Given $p$ traits, this index is defined by:

$$I_{PB} = \sum_{i=1}^{p} b_i x_i$$

where $x_i$ is the value of the genotype for trait $i$. The coefficients, $b_i$ , are computed from:

$$\mathbf{b} = \mathbf{b}^{-1}\mathbf{g}$$

with

- $\mathbf{b}$ the vector of index coefficients,
- $\mathbf{V}$ the genetic variance-covariance matrix, and
- $\mathbf{g}$ the vector of desired genetic gains to be specified by the breeder.

## 2  Computation

The computation of this index has been implemented in the R function `PesekBaker` that is available in the `PesekBaker.R` file. The usage of the function is:

```
PesekBaker <- function(..., geno, env, rep, dgg=NULL, sf=0.1)
```

where

- `...` is a list of traits,
- `geno` is the index for genotypes,
- `env` is the index for environments,
- `rep` is the index for replications,
- `dgg` is the vector of desired genetic gains, standard deviations by default, and
- `sf` is the selected fraction, 0.1 by default.

The function returns the following elements:

- `$Genetic.Variance`: The estimated genetic variances.
- `$Correlation.Matrix`: The estimated correlation matrix.

- `$Covariance.Matrix`: The estimated covariance matrix.

- `$Index.Coefficients`: The index coefficients.

- `$Std.Response.to.Selection`: The standardized response to selection.

- `$Response.to.Selection`: The response to selection.

- `$Pesek.Baker.Index`: The Pesek-Baker index value.

- `$Sorted.Pesek.Baker`: The Pesek-Baker index value sorted in descending order.

# 3    References

- Pesek, J. and R.J. Baker.(1969). Desired improvement in relation to selection indices. *Can. J. Plant. Sci.* 9:803-804.