

GCK Beta Version User Notes

(Current version: 1.1B4)

GCK version 1.1B4 is a beta version because it has had very little testing. Please use it with care and let us know if you discover any problems (bqlib@hamilton.edu).

This version of GCK will support traits which affect viability, sterility, or recombination frequencies as well as single traits controlled by multiple loci (genetic interactions) and multiple traits controlled by a single locus (pleiotropy), and traits which are differentially expressed in different sexes. Traits may be controlled by either the maternal or the zygotic genome (though not by combinations of the two).

There are no differences in the interface available to the normal user. The construction kit is changed significantly to give access to the new functionality.

The number of traits is no longer set explicitly (in the organism parameter set). It is now set implicitly by the number of traits described in the genetic parameters dialog.

Linkage and sex linkage are set up as before.

For each trait in a problem you need to specify whether the trait should be controlled by the maternal or zygotic genome and a set of from one to four models which will control the expression of the trait. The currently available models are described below. One of the models will be chosen with the indicated probability when the problem begins. Some models control more than one trait—additional traits will be italicized to indicate their subsidiary status.

The following are the genetic models available in version 1.B4 of GCK. This is a somewhat arbitrary set so we would be very interested in your suggestions for additions and/or modifications. Please send these to jnc@lilly.com.

The 'invisible' traits (Sterility, Lethality, and Recombination) can be a bit confusing since they have no visible correlate in the vial window. The 'Recessive Pleiotropic' versions of these are pleiotropic to visible traits which are always 2 allele traits. The 'Recessive' (non-pleiotropic) versions are completely invisible. The 'No Phenotype' model is a useful alternative to the invisible traits. It is an invisible trait that has no phenotypic effect at all.

L=lethal, S=sterile

One Locus Classical:

Dominant/Recessive

nominal trait

3:1

Codominance

nominal

1:2:1

Lethality (recessive)

3:1L

Lethality (rec. pleiotropic)

1L:2:1

Lethality (dominant)

3L:1

Pleiotropy

3:1 and 1:2:1 or

-one dominant one codominant

3:1 and 3:1 or

-both dominant

1:2:1 and 1:2:1 or

-both codominant

1:3 and 3:1

-both dominant but opposite dominance

Sterility (recessive)

1S:3

Sterility (rec. pleiotropic)

1S:2:1

1S:3

One Locus Multiple Alleles

3 alleles 3 variations-no codominance

3 alleles 4 variations

-one codominant allele pair

3 alleles 5 variations

3 alleles 6 variations

-all allele pairs codominant

3 alleles 3-6 variations

-one of the above is chosen when the problem starts

4 alleles 4 variations

4 alleles 5 variations

4 alleles 6 variations

4 alleles 7 variations

4 alleles 8 variations

4 alleles 9 variations

4 alleles 10 variations

4 alleles 4-10 variations

5 alleles 5 variations

-no codominance

5 alleles 15 variations

-complete codominance

5 alleles 5-15 variations

-choice of from 5 to 15 variations

Two Locus Interactions

9:3:3:1

9:7

13:3

9:3:4

12:3:1

15:1

1:2:1:3:6:3

1:2:1:2:4:2:1:2:1

9:6:1

7:6:3

6:3:3:4

7:4:3:2

11:5

12:4

11:4:1

10:5:1

12:1:2:1

11:2:2:1

1:4:6:4:1

Classical Gene Interaction

9:3:3:1 or 1:2:1:2:4:2:1:2:1 or 1:2:1:3:6:3

Epistasis (biochemical)

9:3:4 (linear) or 9:7 (parallel) or 15:1 (converging)

General (2 phenotypes)

15:1 or 12:4 or 13:3 or 9:7 or 11:5

General (3 phenotypes)

12:3:1 or 9:6:1 or 9:3:4 or 11:4:1 or 10:5:1 or 7:6:3

General (4 phenotypes)

9:3:3:1 or 11:2:2:1 or 12:1:2:1 or 7:4:3:2 or 6:3:3:4

General (n phenotypes)

Any of the two locus interaction ratios listed above.

Semi-Quantitative

1:4:6:4:1 or 11:5 or 11:2:2:1 or 11:4:1

Sex Limited/Influenced

Sex Limited (general)

all females one variation all males another

Sex Limited Recombination

No recombination in one sex

Sex Limited Infertility (rec)

recessive male or female sterility

Sex Influenced Dominance

1 allele dominant in females, the other in males or

1 allele dominant in females but codominant in males or

vice-versa

Variations

'Balanced' Lethals

It is possible to build a balanced lethal stock with this model.

2 recessive lethals