The design parameters that are studied here consists of v = 6, r\_b = 3, r\_t = 2, n\_\gamma = 4 and n\_R = 15. If the first phase experiment is RBD, then number of cage, n\_C = 3.

**The first phase is CRD**

The first phase theoretical ANOVA is expressed as follows

$ANOVA

DF e Ani

Between Ani

Trt 5 1 2

Residual 12 1 2

Within 18 1 0

$EF

Trt eff.Trt

Between Ani

Trt 6 1

Within

Based on the random effects table, all the treatment information is in the Between Animal stratum.

The following allocation of animals to runs and tags were found and expressed as matrix,

[,1][,2][,3][,4]

[1,] "K" "D" "G" "N"

[2,] "D" "K" "N" "G"

[3,] "A" "P" "Q" "C"

[4,] "P" "A" "C" "Q"

[5,] "I" "H" "J" "L"

[6,] "H" "I" "L" "J"

[7,] "M" "R" "O" "B"

[8,] "R" "M" "B" "O"

[9,] "F" "F" "E" "E"

The canonical efficiency factors and average efficiency factor associated with the Between Animals Between Runs stratum for this design can be expressed as follows

$nCan

[1] 5

$can.eff

[1] 1 1 1 1 1

$ave.eff

[1] 1

The canonical efficiency factors and average efficiency factor associated with the Between Animals Within Runs stratum for this design can be expressed as follows

$nCan

[1] 13

$can.eff

[1] 1 1 1 1 1 1 1 1 1 1 1 1 1

$ave.eff

[1] 1

The animal occurrence matrix with respect to runs can be expressed as follows

> print(N %\*% t(N))

Ani

Ani A B C D E F G H I J K L M N O P Q R

A 2 0 2 0 0 0 0 0 0 0 0 0 0 0 0 2 2 0

B 0 2 0 0 0 0 0 0 0 0 0 0 2 0 2 0 0 2

C 2 0 2 0 0 0 0 0 0 0 0 0 0 0 0 2 2 0

D 0 0 0 2 0 0 2 0 0 0 2 0 0 2 0 0 0 0

E 0 0 0 0 4 4 0 0 0 0 0 0 0 0 0 0 0 0

F 0 0 0 0 4 4 0 0 0 0 0 0 0 0 0 0 0 0

G 0 0 0 2 0 0 2 0 0 0 2 0 0 2 0 0 0 0

H 0 0 0 0 0 0 0 2 2 2 0 2 0 0 0 0 0 0

I 0 0 0 0 0 0 0 2 2 2 0 2 0 0 0 0 0 0

J 0 0 0 0 0 0 0 2 2 2 0 2 0 0 0 0 0 0

K 0 0 0 2 0 0 2 0 0 0 2 0 0 2 0 0 0 0

L 0 0 0 0 0 0 0 2 2 2 0 2 0 0 0 0 0 0

M 0 2 0 0 0 0 0 0 0 0 0 0 2 0 2 0 0 2

N 0 0 0 2 0 0 2 0 0 0 2 0 0 2 0 0 0 0

O 0 2 0 0 0 0 0 0 0 0 0 0 2 0 2 0 0 2

P 2 0 2 0 0 0 0 0 0 0 0 0 0 0 0 2 2 0

Q 2 0 2 0 0 0 0 0 0 0 0 0 0 0 0 2 2 0

R 0 2 0 0 0 0 0 0 0 0 0 0 2 0 2 0 0 2

The trace of the occurrence matrix is computed as follows

> tr(N %\*% t(N))

[1] 40

The following allocation of treatments to runs and tags were found and expressed as matrix,

[,1] [,2] [,3] [,4]

[1,] "e" "d" "a" "b"

[2,] "d" "e" "b" "a"

[3,] "a" "d" "e" "c"

[4,] "d" "a" "c" "e"

[5,] "c" "b" "d" "f"

[6,] "b" "c" "f" "d"

[7,] "a" "f" "c" "b"

[8,] "f" "a" "b" "c"

[9,] "f" "f" "e" "e"

The canonical efficiency factors and average efficiency factor associated with the treatment effects in the Between Animals Within Runs stratum for this design can be expressed as follows

$can.eff

[1] 0.9166667 0.9166667 0.8888889 0.7500000 0.7500000

$ave.eff

[1] 0.8370323

The second phase theoretical ANOVA is expressed as follows

DF e Ani Run

Between Run

Between Ani

Trt 4 1 2 4

Residual 4 1 0 4

Within

Between Ani

Tag 1 1 2 0

Trt 5 1 2 0

Residual 7 1 2 0

Residual

Tag 2 1 0 0

Residual 12 1 0 0

$EF

Tag Trt eff.Tag eff.Trt

Between Run

Between Ani

Trt 3/4 1/8

Residual

Within

Between Ani

Tag 9 2/3 1 1/9

Trt 7920/1577 1320/1577

Residual

Tag 9 1

Compared this ANOVA table of the first phase experiment, 5 DF associated with the animal effects are lost from the first phase experiment. The 4 DF of 5DF for the animals are now in the Between Runs stratum and 1 DF associated with tag effects is now in the Between Animals Within Runs stratum. In addition, the amount of treatment information remains for conducting the test is now 0.8370 from 100% of the first phase experiment.