PRACTICE

RANDOMISATION AFTER CLASS · 8–10 MINUTES

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ONE DESIGN, MANY RESULTS

The design fixes:

- 24 experimental units
- four diet levels
- six pens assigned to each diet
- the random procedure

The seed selects one allocation from the allocations allowed by that design.

SEEDS ARE NOT SCORES

```
treatments <- rep(
  c("Control", "Diet A", "Diet B", "Diet C"),
  each = 6
)

set.seed(123)
sample(treatments) |> head()
```

```
[1] "Diet B"  "Diet C"  "Diet B"  "Control" "Diet A"  "Diet B"
```

```
set.seed(202)
sample(treatments) |> head()
```

```
[1] "Diet B"  "Diet B"  "Diet A"  "Diet C"  "Control" "Diet C"
```

Different outputs can both be valid.

CHANCE IMBALANCE

The seed-123 allocation had six pens per diet, but Diet C appeared in four Central-room pens.

That does not show that:

- `sample()` failed
- the allocation was non-random
- the researcher should silently redraw

It shows that overall balance does not imply balance within every room.

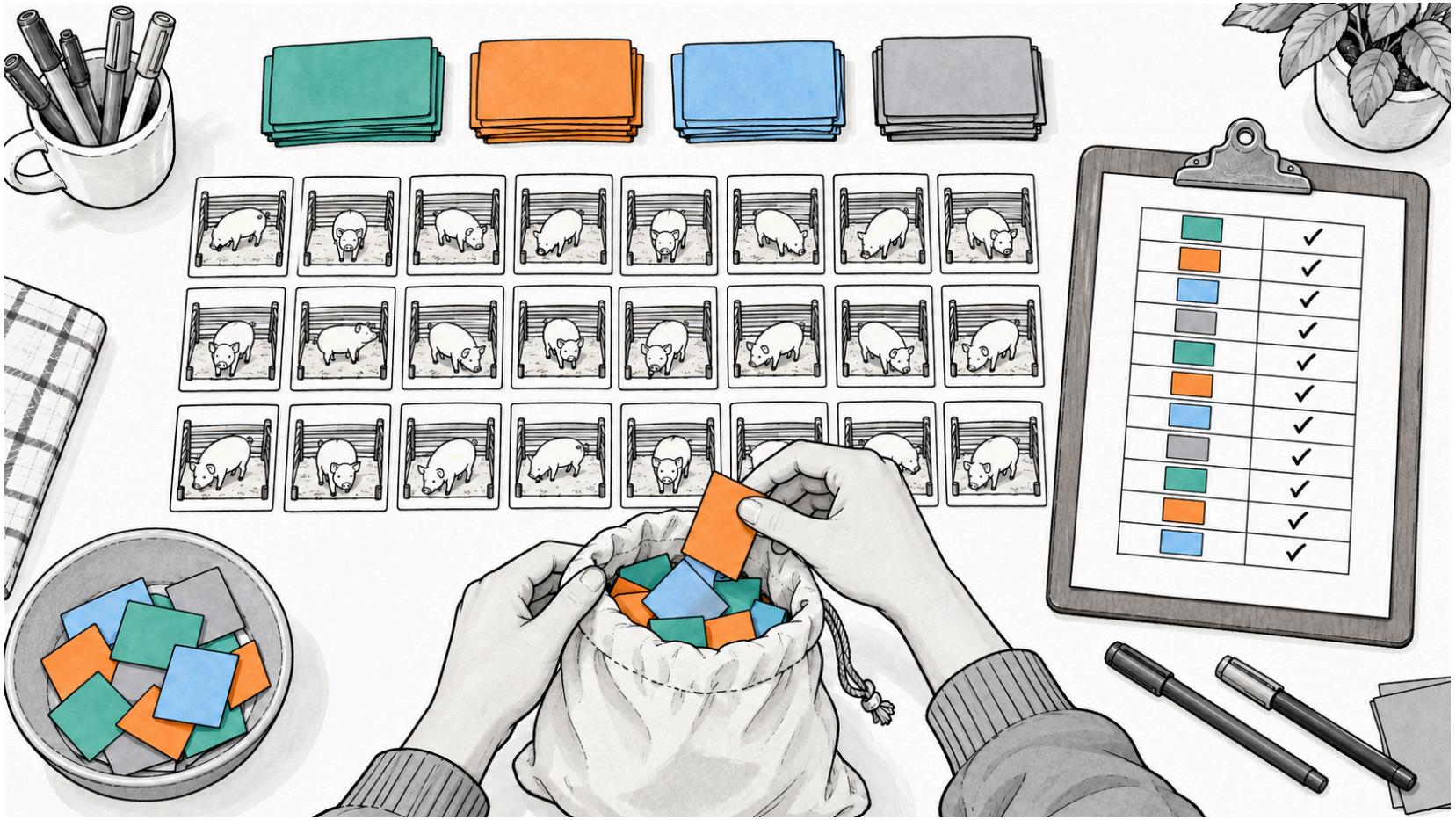
DECIDE CONSTRAINTS FIRST

Before generating an allocation, record:

- the experimental unit
- treatment replication
- any scientifically justified blocks or restrictions
- the random procedure
- the checks that must pass

Then generate once, check, and retain the result.

FOUR RECORDS



REPRODUCIBLE MEANS COMPLETE

Keeping only the seed is insufficient.

```
set.seed(123)
```

The same seed can produce a different result if:

- the unit order changes
- the treatment vector changes
- another random operation occurs first
- the code changes

AUDIT WITHOUT REDESIGNING

Check that:

- each experimental unit appears once
- treatment totals match the design
- pre-specified restrictions are satisfied
- no predictable non-random rule replaced the draw
- the retained table matches what is implemented

An audit checks the planned rules; it does not invent new rules after seeing the result.

READ AND REFLECT

Read Ruxton and Colegrave, Chapter 7, sections 7.1–7.4, pp. 101–108.

As you read, answer:

1. What feature of random allocation limits researcher choice?
2. Why can a random allocation contain imbalance?
3. Which records would let another researcher audit your allocation?

SOURCES

Ruxton, Graeme D., and Nick Colegrave. 2016. *Experimental Design for the Life Sciences*. 4th ed. Oxford: Oxford University Press. Chapter 7, sections 7.1–7.4, pp. 101–108. ISBN 978-0-19-871735-5. Publisher page.

R Core Team. 2026. *R: A Language and Environment for Statistical Computing*. Vienna: R Foundation for Statistical Computing. R project.