It's not the technology, it's the algorithms

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John Deen

New technologies in pig production

- Produce data e.g. weight
  - Or aid in implementing data-driven decisions e.g. sorting
- Can replicate human observation e.g. counts
  - Or create new measures e.g. activity levels
- Can measure continuously eg lameness
  - When no one is in the barn
- Particularly adept at transforming averages into individual data (stockmanship)

Forbes:

Big Data Overload: Why Most Companies Can't Deal With The Data Explosion

Bernard Marr
Contributor

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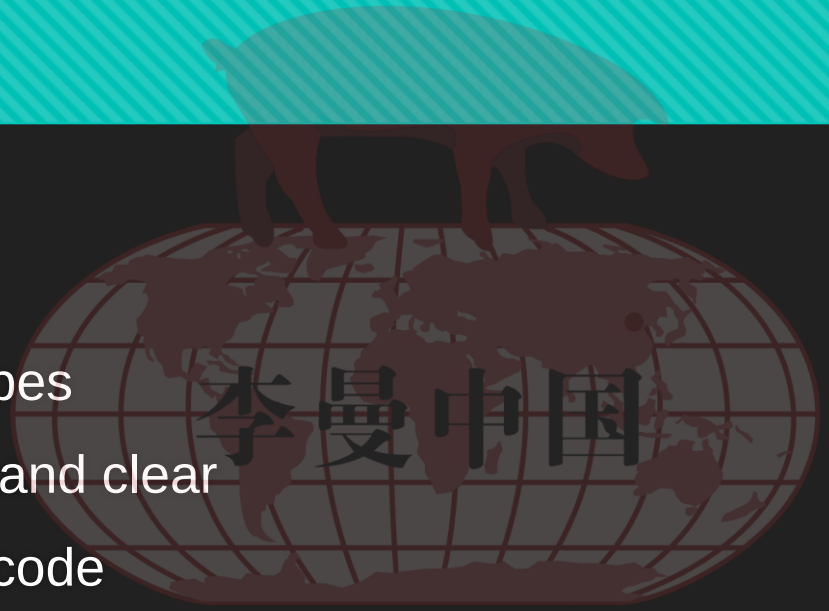
Most companies I interact with already have too much data. With this post, I would like to make the point that people and companies already can’t cope with the data they have today, let alone the data that is around the corner.

Algorithms

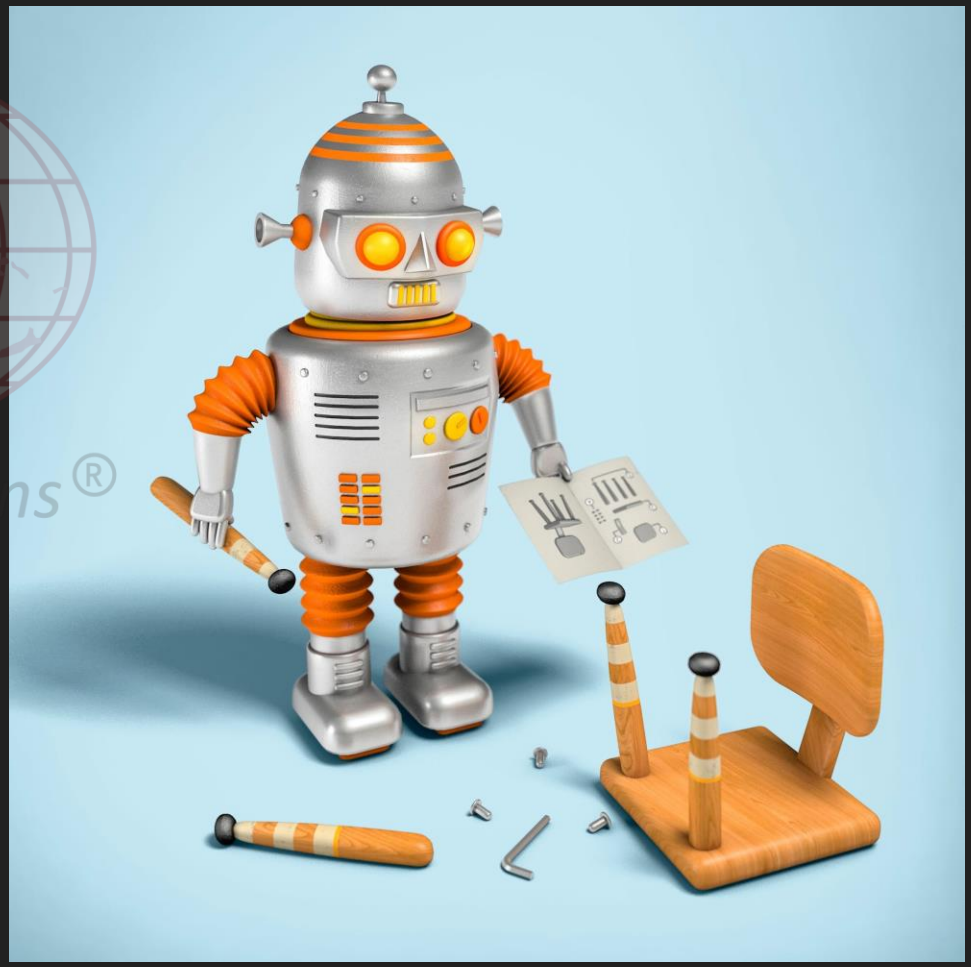


- Algorithms are like recipes
- Algorithms are specific and clear
- Algorithms are lines of code
- Algorithms are everywhere

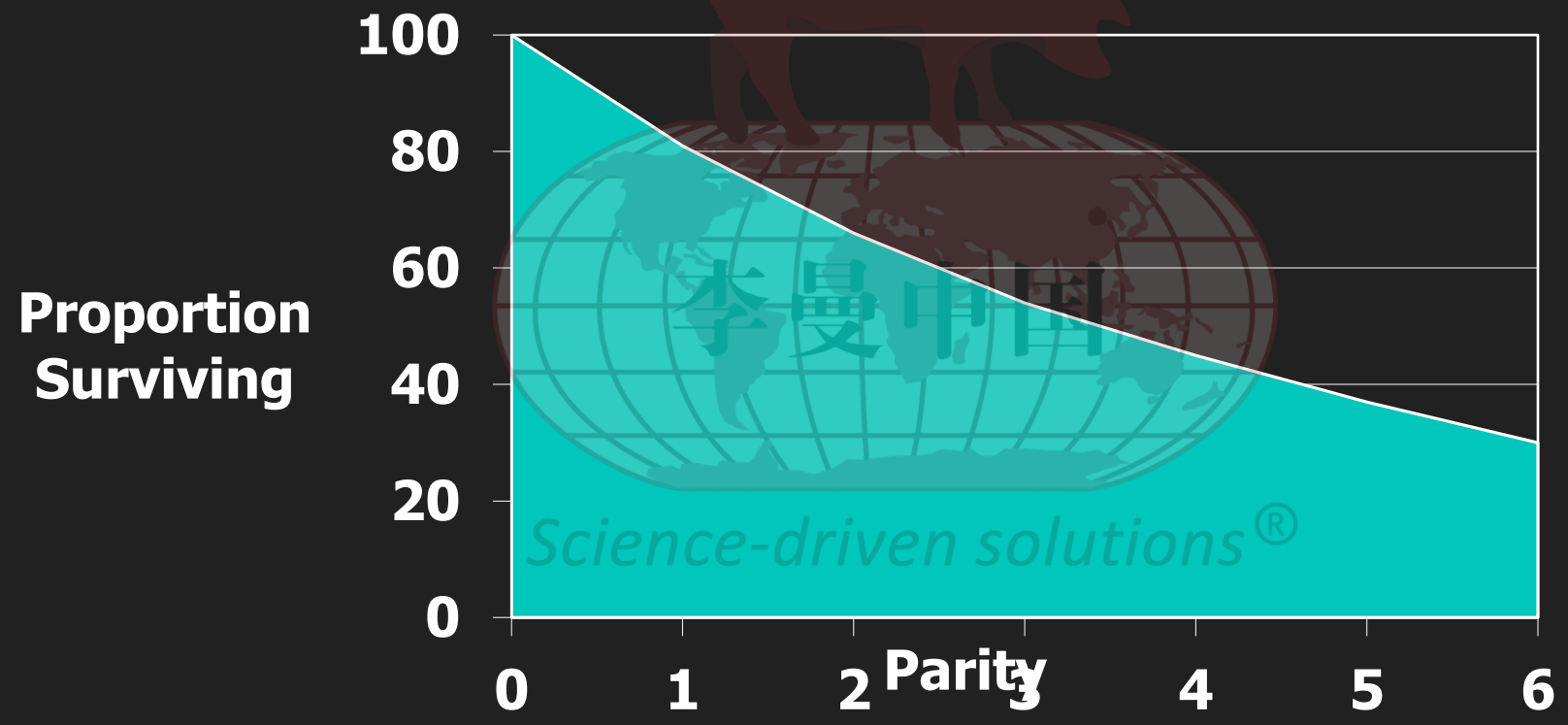
- Need to fit the objectives of the farm

Data needs to be transformed into actions

- It's not just artificial intelligence
- Needs structure, boundaries, logic
- Biology
- Norms
- Feasibility



Sow Attrition



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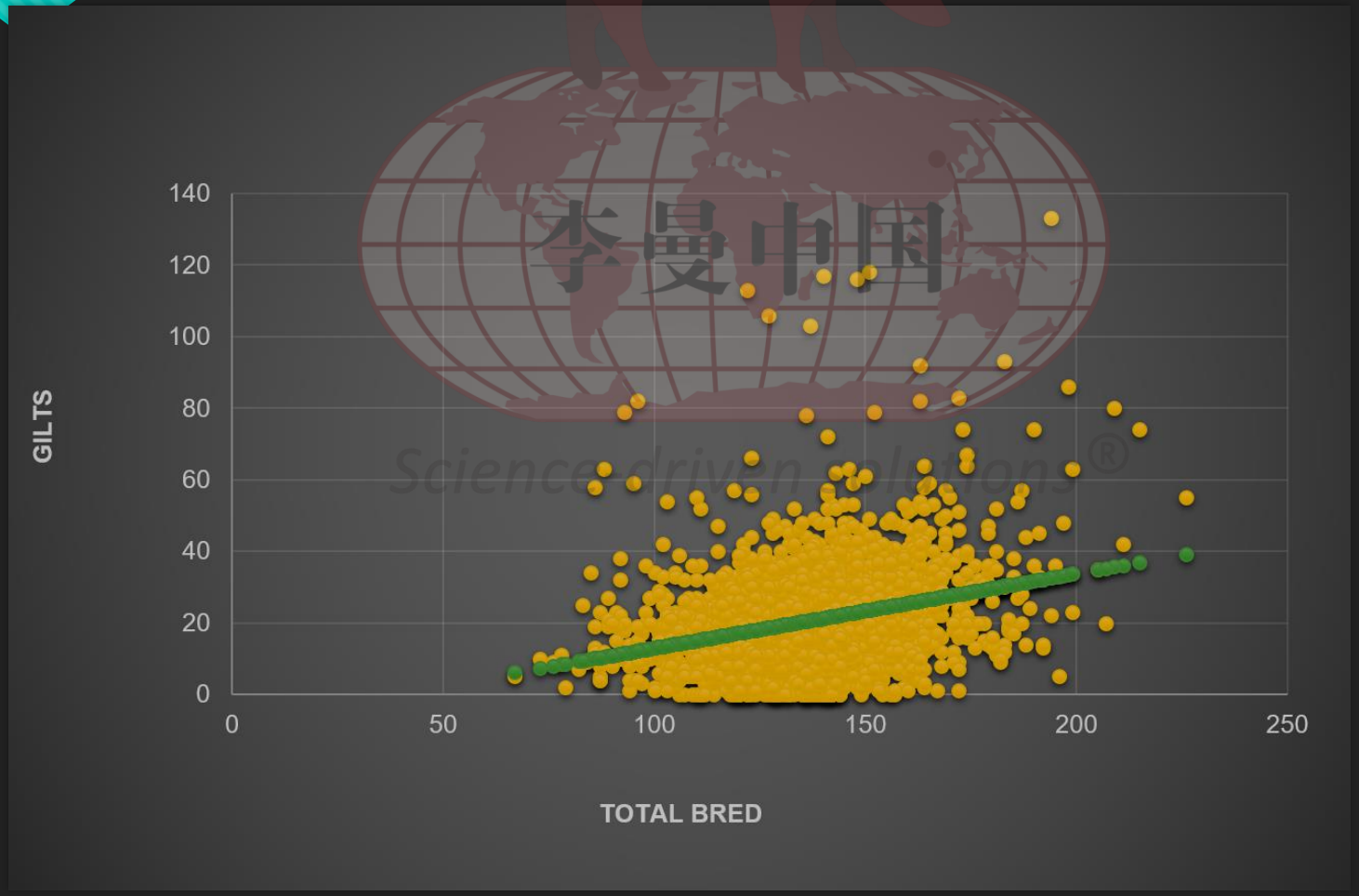
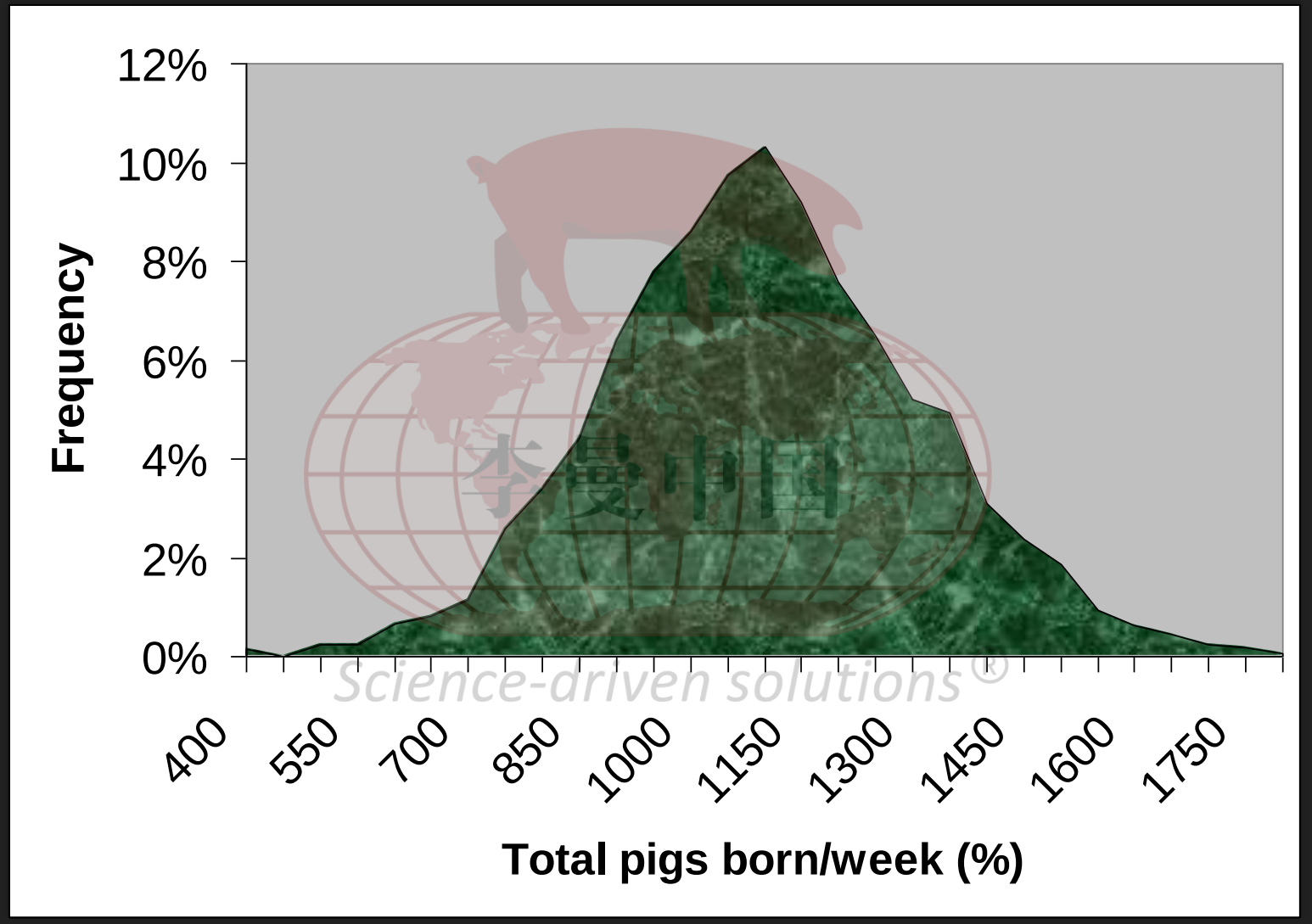
Gilts vs Total Bred (R^2=.07)




12%
10%
8%
6%
4%
2%
0%
Frequency
400
550
700
850
1000
1150
1300
1450
1600
1750
Total pigs born/week (%)
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Types of culls

- Good culls
  - Sow culled due to old age
  - Sold at full value
  - At weaning
  - Has a prepared replacement available
- Bad culls
  - Young
  - For welfare reasons
  - At times other than weaning
  - Without a prepared replacement available
  - For improvement of productivity without substantiation

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Culling algoritms for productivity

- Also called voluntary culling
- Future productivity of a sow predicted by past performance *and herd productivity*
  - The worse the herd is, the less predictable is sow culling for productivity
  - One can't cull to good herd productivity
  - One litter is almost never enough
- Driven by gilt availability and breeding target more than sow characteristics
  - Challenge of history vs pathology

Productivity aims

- Pigs/sow/year is a poor objective
  - Empty space is not productive
- Herd productivity much more useful
  - Especially when it is consistent
- Productive culling means a more productive replacement occurs
  - Rarely measured
  - Culling and mortality differ by sales income

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What is the problem?

- End-point quality control
- Should be preventable traits
- Predictability rarely tested, retrospective studies flawed
- Wide variation across industry
- Variation of application within farms over time

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Culling rate is a bad number

- Mixes good and bad culls
- Very unstable – 2 years of data is good
- Driven by breeding target and gilt availability, less by biology
- Alternatives:
  - Retention rates by 2nd or 3rd farrowing
  - Bad cull: Good cull ratios
  - Attrition curves

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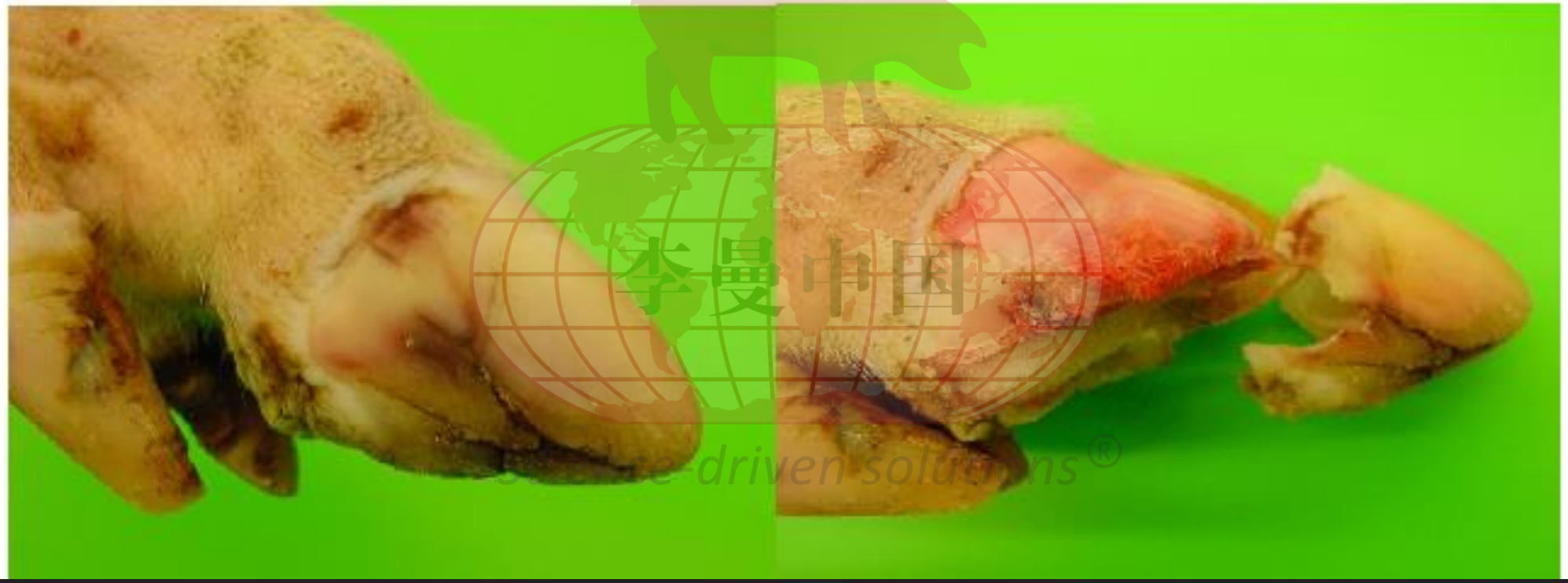
Culling for productivity

- An empty sow space is worse than poor productivity sow (though it makes pigs/sow/year look good)
- Culling for productivity (numbers) is often not tested and overestimated in efficacy
- The condition of the sow is usually a better predictor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Culling for pathologies

- Often associated with lower productivity
- Often the driver of lower productivity
- Often not assessed
- Even less likely to be recorded
- Inflammation, pain can have profound effects on reproduction
- Often can be treated

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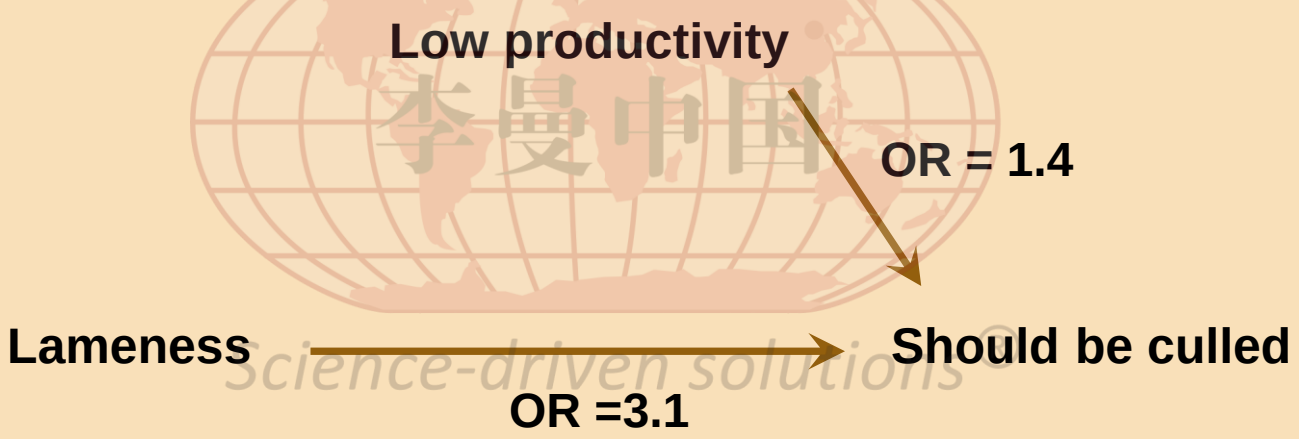
Proposed path model for sow retention



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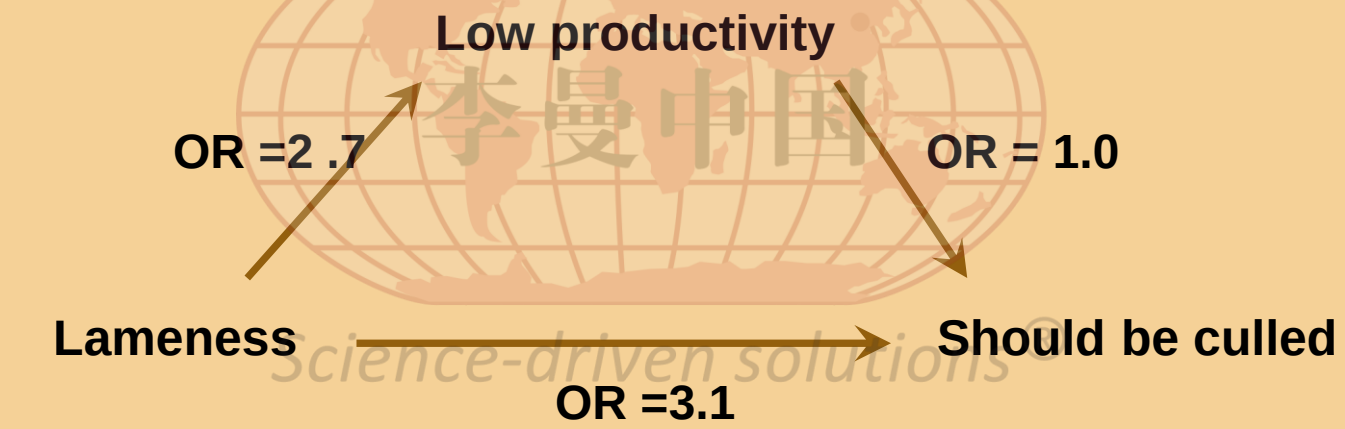
Proposed path model for sow retention



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Culling or retaining questions

- Herd vs sow?
- Burden of proof?
- Predictability of outcome?
- How do we measure and predict durability?
- Are we assessing for repeatable or mechanical traits?
- Are we biased by quantitative data?
  - Sow card vs sow

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New algorithms for sow culling

- Need new data: lameness measurements
  - Lameness is not the gait, but the willingness to stand and walk (eat and drink)
- Need to also measure pathologies (feet, reproductive tract, condition, age)
- Need to prioritize culling decisions (culling scores) based on expected outcomes

Discoveries in culling algorithms

- Predictability of future performance if more data is used:
  1. Pathologies
  2. Farrowing crate activity
  3. Feed intake
  4. Age
  5. Reproductive history
- Should be performed off-site
- Culling priorities should be ranked to allow breeding targets to be met

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