

# BRITISH GENETICS

## 英國基因技術發展

The role of pig genetics in  
the value added pork chain

遺傳育種在養豬產業增值上的貢獻

Lynn Evans

林 埃文斯

Export Manager

業務發展經理

JSR Genetics Ltd.

JSR遺傳有限公司

# Global Meat Consumption

## 全球肉類消費量

- Global meat consumption will increase from 190 million to 225 million tonnes by 2007.

全球肉類消費量在2007年以前將從1億9,000萬公噸增加為2億2,500萬公噸。

- Pig meat and Poultry meat will continue to dominate about equally

豬肉和禽肉將持續以大致相當的佔有率主宰肉類消費市場。

# Global Trade in pigmeat

## 全球豬肉貿易

- Currency fluctuations – major influence  
通貨波動 – 主要影響
- Exports from low cost or high health areas are increasing - US, Canada, Brazil  
來自低成本或高健康地區的出口持續增加 – 美國、加拿大、巴西
- Imports into high cost areas are increasing - Japan, Russia, Korea  
進口至高成本地區持續增加 – 日本、俄羅斯、韓國
- Significant tariff and non-tariff barriers remain  
重大關稅及非關稅障礙仍然存在
- Disease outbreaks and food scares have been a major disruption to normal trade  
疾病爆發和食品恐慌始終為打亂正常貿易的主要因素

# Hierarchy of Consumer Concern

## 消費者關切階系圖



# Factors to consider

## 需要考慮的因素

- Food safety for the consumer

對消費者的食品安全

- Zero use of hormones 零使用荷爾蒙
- Reducing use of growth promoters 減少使用生長促進劑
- Reducing use of antibiotics 減少使用抗生素

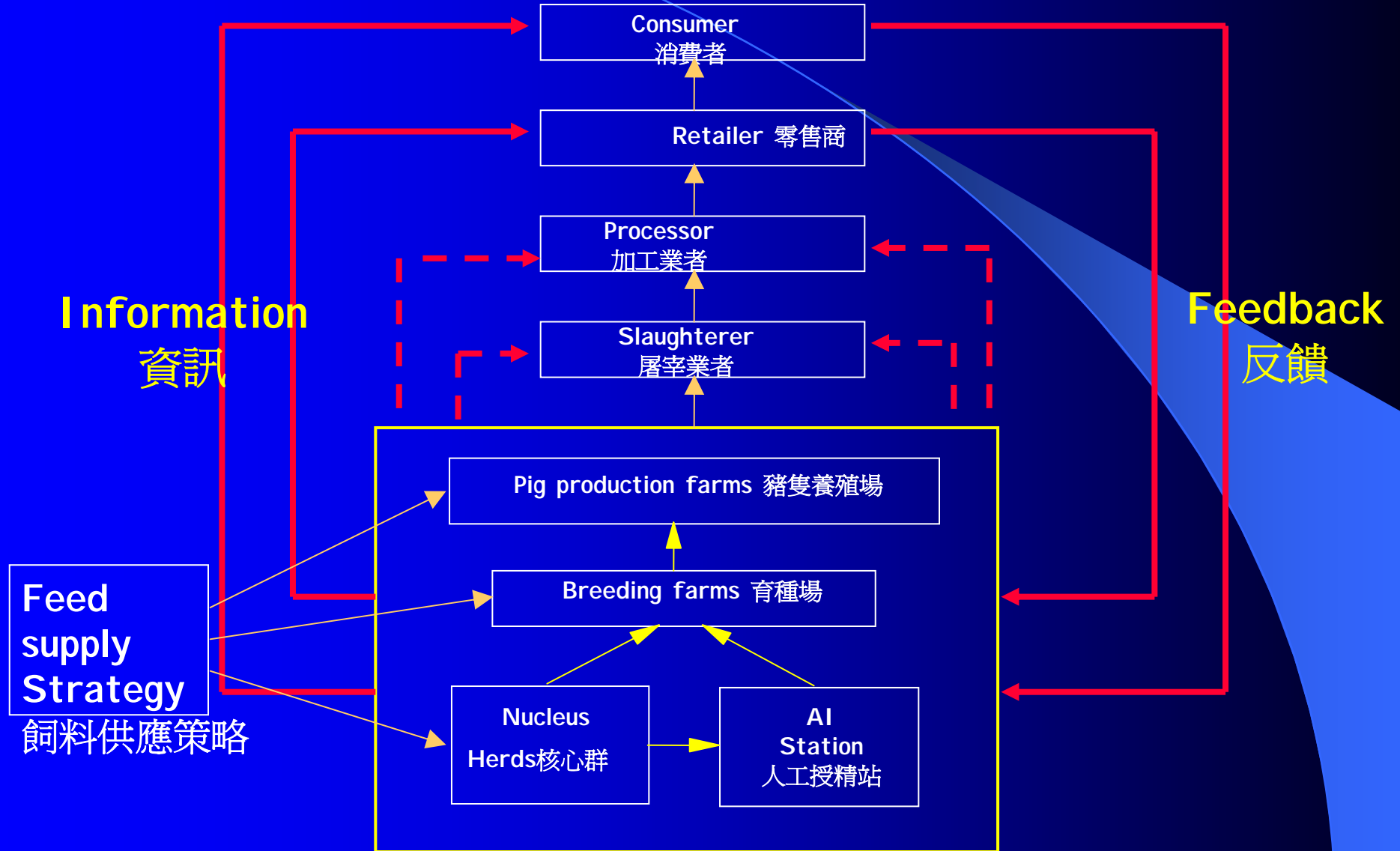
- Requires healthy pigs

要求健康豬隻

- Genetics from high health supply 高度健康基因來源
- Improved bio-security 改善的生物安全性
- Good hygiene practices and routines 良好的衛生實務和日常程序
- All in – All out system 全進全出制度

# The Value Added Pork Chain

## 附加價值豬肉供應鏈



# Assured British Pig Quality Standard Scheme

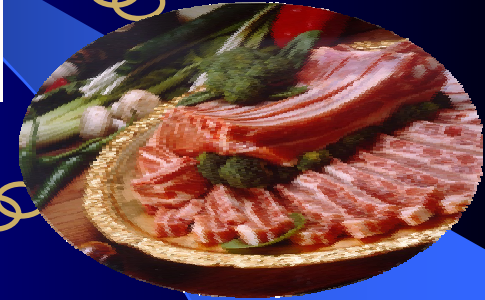
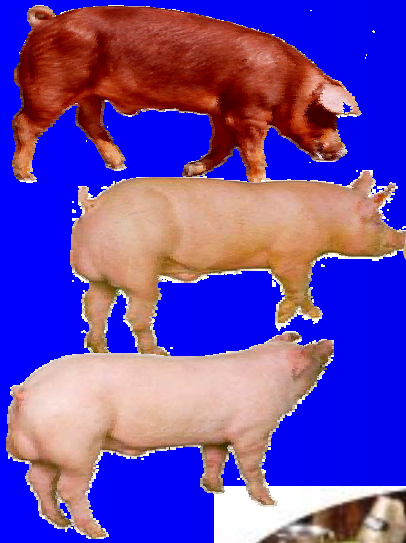
## 可靠的英國豬隻品質標準方案



# The Pork Value Chain 豬肉價值鏈

Customised programmes for specific markets

特定市場客製化計劃



rips



# British pigs exported world-wide 英國豬隻外銷全世界



# Genetics - science of heredity

## 基因學 - 遺傳科學

- Genetic Breeding Programmes

### 基因育種計劃

- Cumulative 累積性
- Permanent 長久性
- Sustainable 永續性

# Genetics

## 基因學

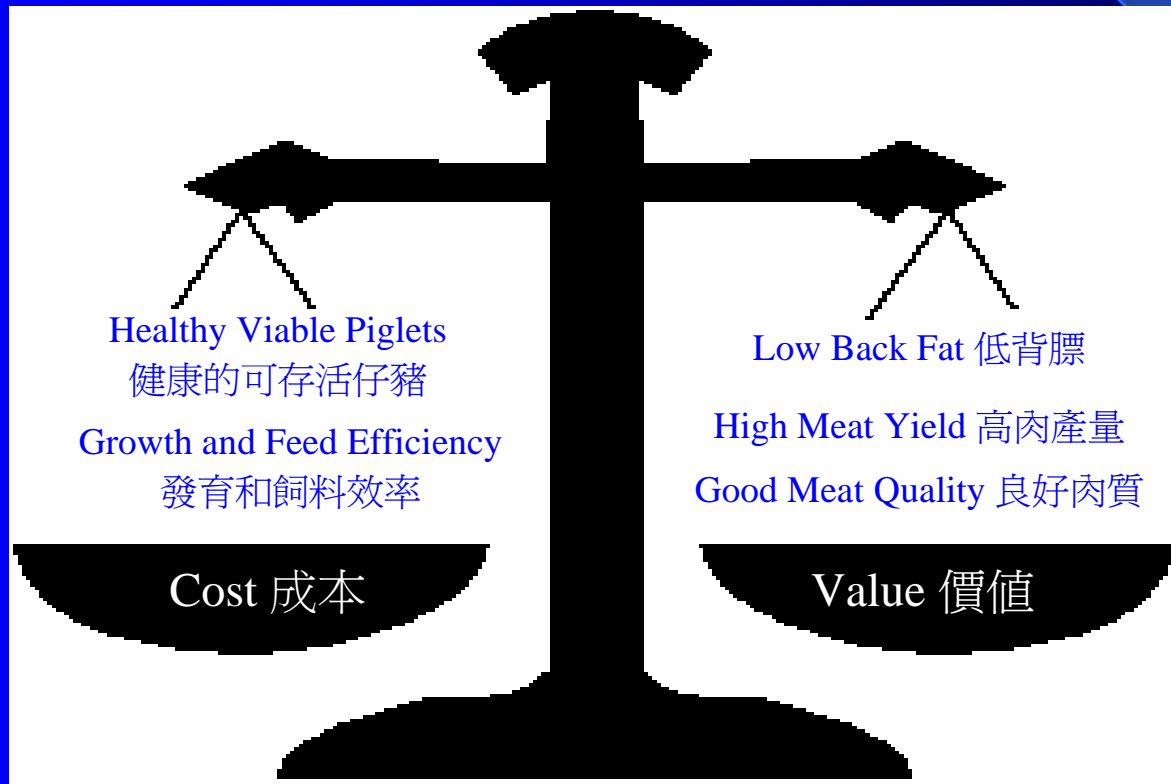
- Genetic improvement is continuous  
基因持續改良
- Annual gains in excess of U\$2 per slaughter pig  
每頭屠宰豬每年增利超過2美元
- Selection today has: -  
目前選育作業已經： -
  - Increased emphasis on litter size  
增加對窩仔數的重視
  - Increased emphasis on meat quality  
增加對肉質的重視
  - Increased emphasis on disease resistance  
增加對抗病性的重視
- UK maintains its number one position in the world  
英國維持世界第一的地位

# The Goal: Increase Farm Profitability

目標：提升農場獲利性

*“Reduce the cost of production and increase the value of the product”*

*“降低生產成本；提升產品價值”*



# Achieving Success

## 獲致成功

- Maximising hybrid vigour  
發揮最大混種優勢
- Separate selection for the sire and dam line  
父系與母系分別選育
- Accurate performance testing  
精確的表現檢驗
- Sophisticated multi-trait selection indices  
純熟的多元性狀選育指數
- Selection using commercial feed rations  
運用商業飼料配給量選育
- Rapid advances and uptake of new technology  
快速發展及採行新科技

# BLUP

## sophisticated computer software

## 純熟的電腦軟體

- BLUP Best Linear Unbiased prediction  
BLUP = 最佳線性無偏預估
- BLUP uses BLUP運用...
  - Individual performance 個別表現
  - All known relatives 所有已知親屬
- Automatically removes 自動排除...
  - Non-genetic effects (parity, feeding differences, management effects,etc)  
非基因影響 (產次、飼養差異、管理影響...等)
- BLUP accelerates progress BLUP加速進展...
  - Reproductive traits 繁殖性狀
  - Unmeasured traits (feed conversion, lean meat, etc)  
無測量性狀 (飼料轉換、瘦肉...等)

# Dam-line Selection

## 母系選育

to produce the breeding sow

培育種母豬

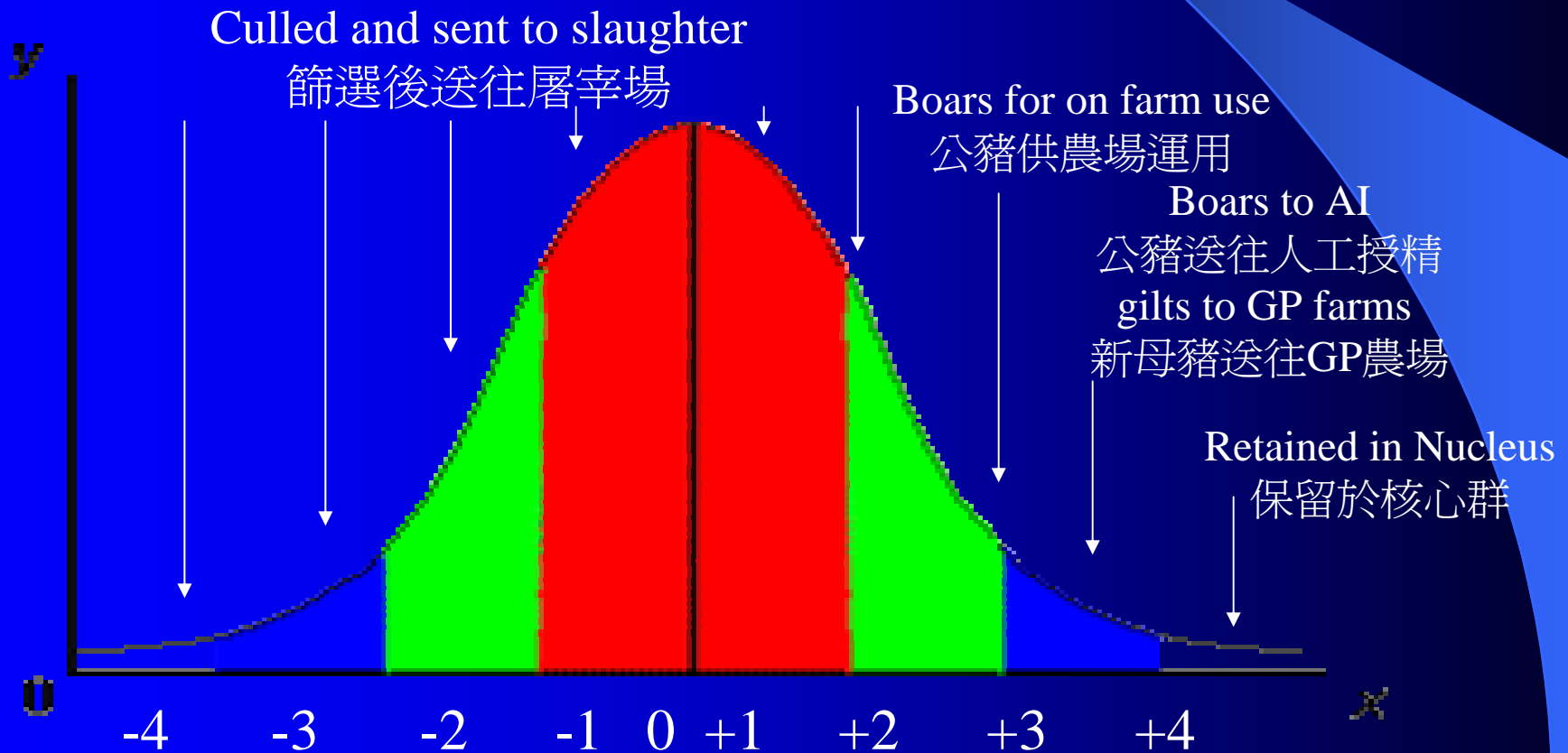
- Minimise inbreeding  
同系繁殖情形減至最低
- Maximise hybrid vigour  
發揮最大混種優勢
- Elimination of paternal effects  
排除父系效應
- Selection for litter size  
選擇窩仔數
- Selection for litter weight (milking ability)  
選擇窩仔重量(吸奶能力)
- Selection for fast re-breeding  
選擇快速再繁殖能力
- Selection for high feed intake (appetite)  
選擇高飼料進食量(胃口)

# Binomial Distribution

二項分佈

## Selection and allocation

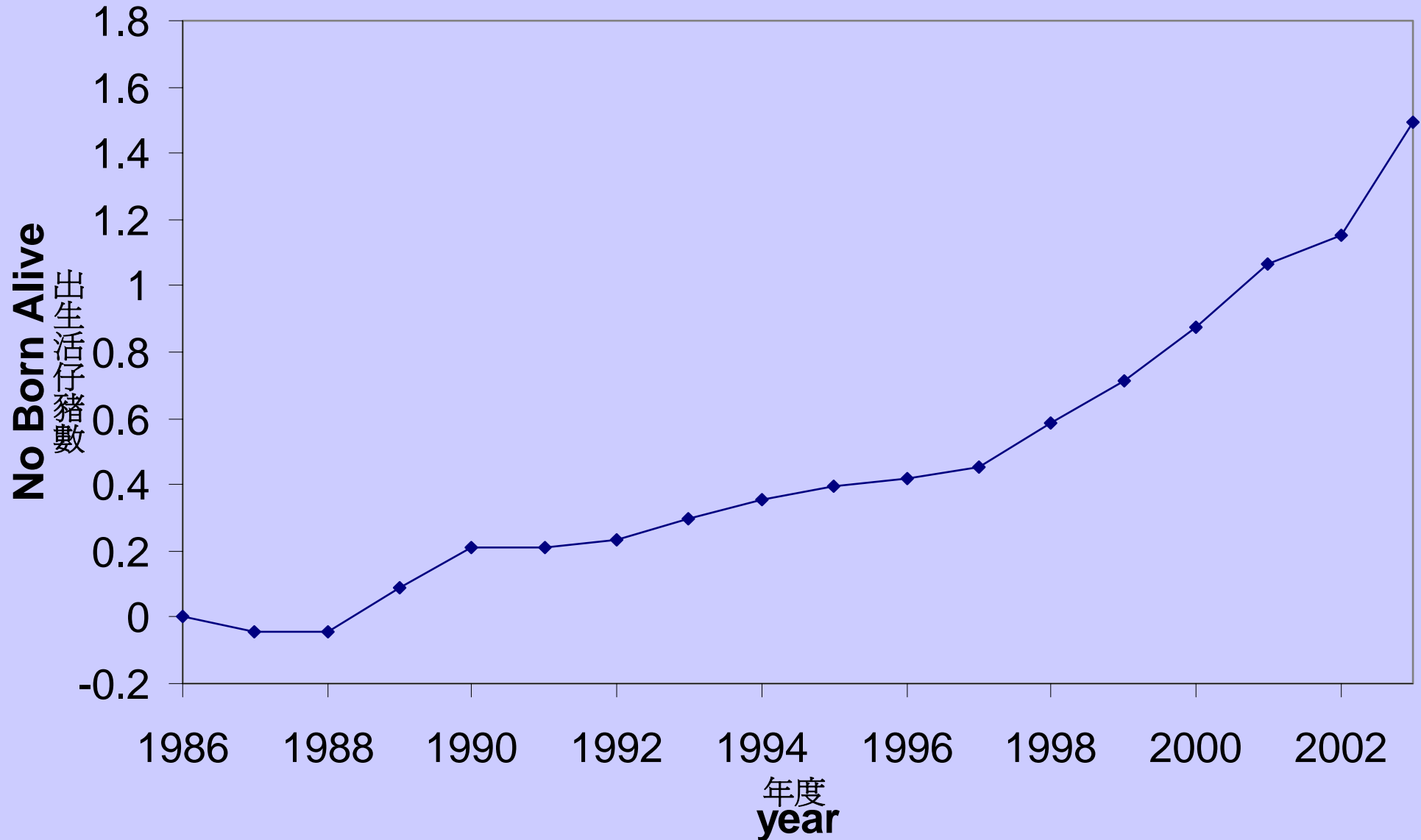
選育與分配





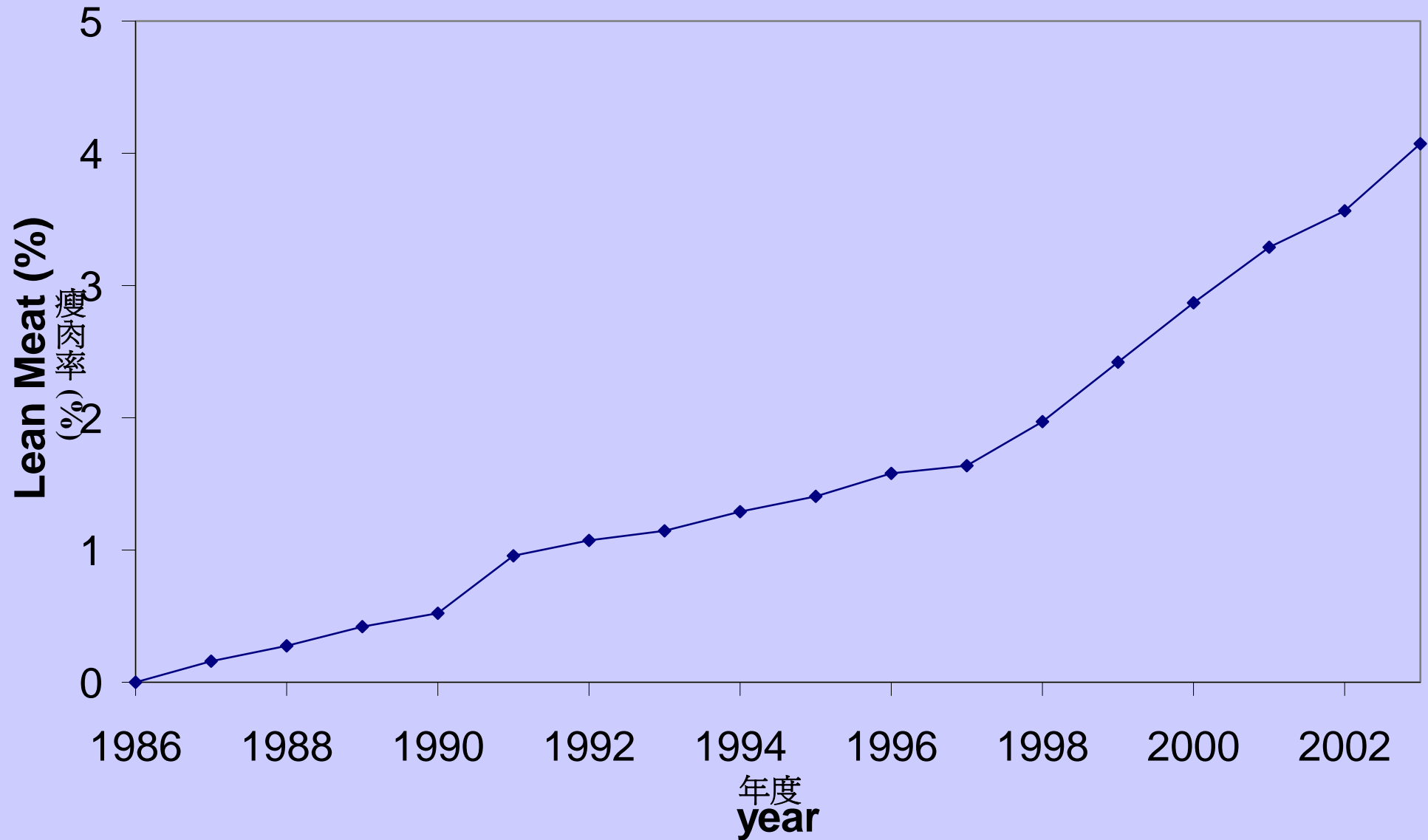
# Parent Gilt - Number Born Alive

父母代種母豬 - 出生活仔豬數



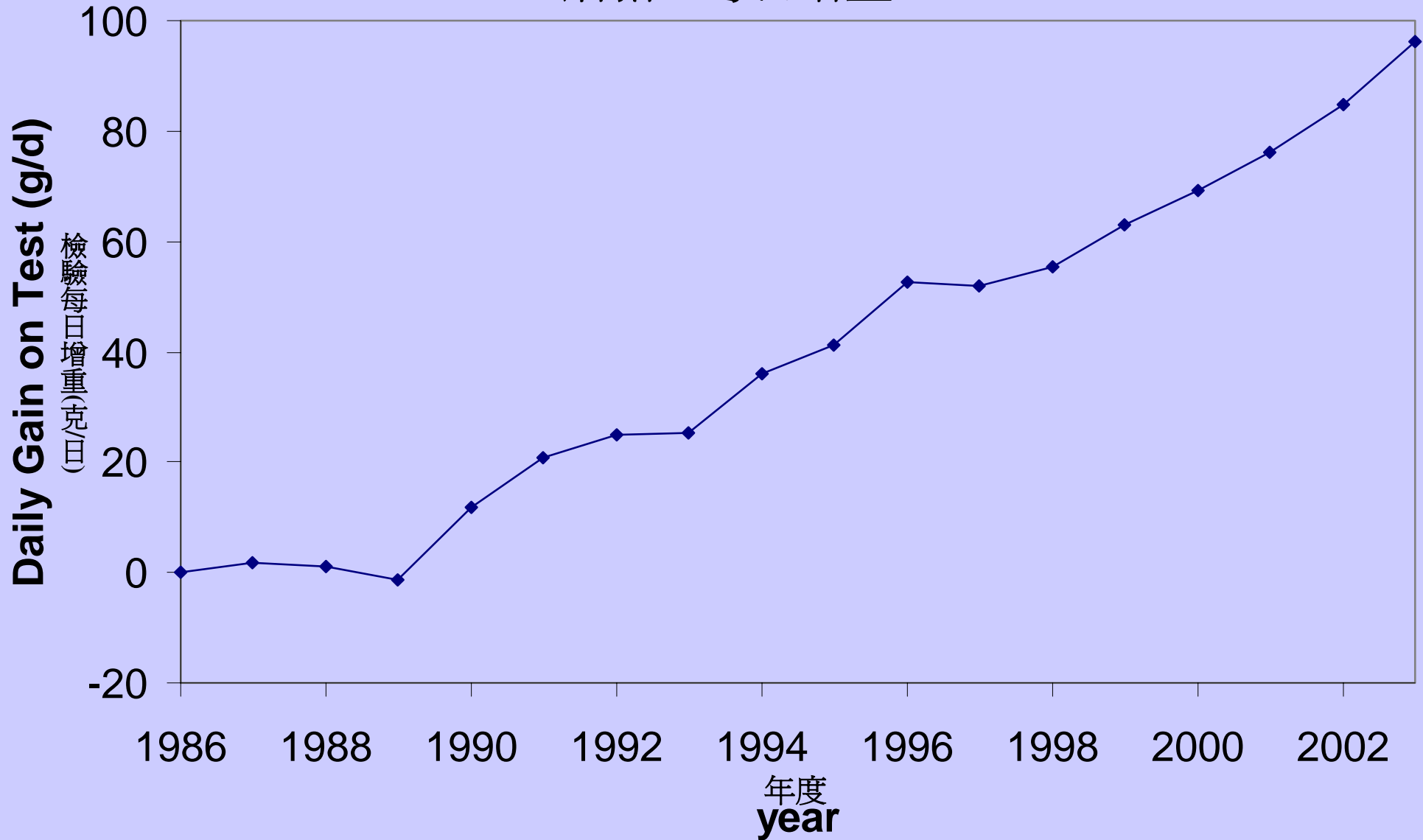
# Slaughter Pig - Lean Meat %

屠豬 - 瘦肉率 %



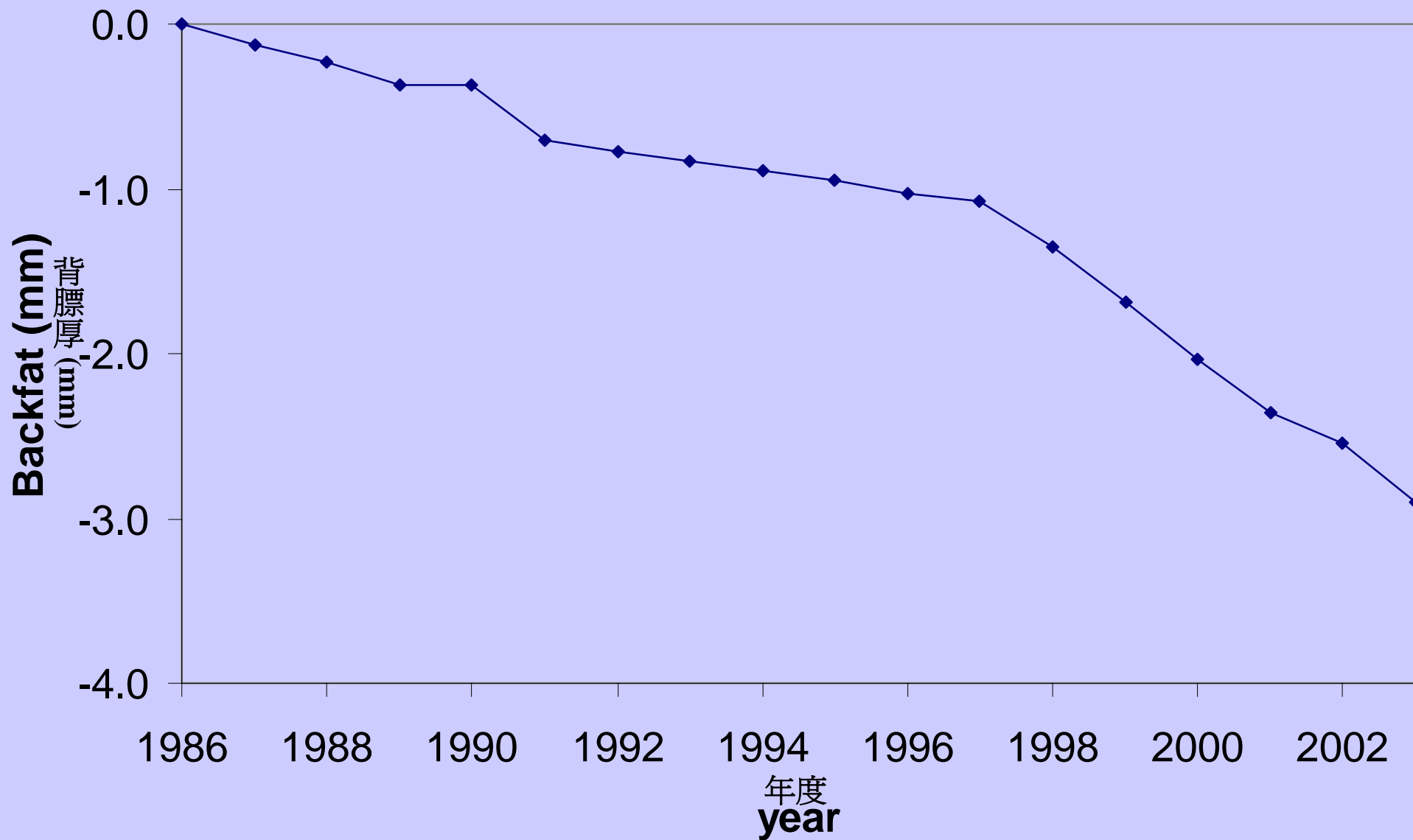
# Slaughter Pig - Daily Gain

屠豬 - 每日增重



# Slaughter Pig - Backfat

屠豬 - 背膘



# Nucleus performance

## 核心表現

|                               |   |             | Top 10%              | Top 20%      |      |
|-------------------------------|---|-------------|----------------------|--------------|------|
|                               |   |             | 前 10%                | 前 20%        |      |
| <b>Damline LR</b><br>斯        | Born alive 出生活仔豬數<br>Growth (g/day) 成長(克/日)<br>Backfat mm 背膘厚(公釐) | 1041<br>7.0 | 16.1<br>1011<br>7.75 | 15.00        | 母系藍瑞 |
| <b>Damline LW</b><br>豬        | Born alive 出生活仔豬數<br>Growth (g/day) 成長(克/日)<br>Backfat mm 背膘厚(公釐) | 1080<br>7.0 | 16.3<br>1023<br>7.8  | 15.40        | 母系大白 |
| <b>Sireline Terminal</b><br>豬 | Growth (g/day) 成長(克/日)<br>Backfat mm 背膘厚(公釐)                      |             | 1190<br>6.95         | 1144<br>7.35 | 父系終端 |

# Farm trial performance

## 農場試驗表現

|   | Parity 1 | Parity 2 | Parity 3 | Parity 4 |
|---|----------|----------|----------|----------|
|   | 產次 1     | 產次 2     | 產次 3     | 產次 4     |
| Number born alive<br>出生活仔豬數             | 11.5     | 11.9     | 12.4     | 12.9     |
| Birth weight<br>出生時重量                   |          |          |          |          |
| Piglet birth weight<br>仔豬出生重量           | 1.43     | 1.76     | 1.73     | 1.71     |
| Pigs/litter after fostering<br>養育後每窩仔豬數 | 11.2     | 11.7     | 12.1     | 11.8     |
| Number weaned<br>斷奶活仔豬數                 | 10.4     | 10.8     | 11.0     | 10.8     |
| Weaning weight<br>斷奶時重量                 |          |          |          |          |
| Piglet weaning weight<br>仔豬斷奶時重量        | 7.46     | 7.93     | 8.16     | 7.44     |
| Weaning age<br>斷奶時豬齡                    | 25.3     | 24.7     | 25.2     | 22.5     |
| Sow feed intake per day<br>牝豬每日飼料進食量    | 5.95     | 6.34     | 6.40     | 6.31     |

Source: BOCM Paul Pig Development Unit

資料來源：BOCM Paul豬隻培育中心

# Economic effect of genetic choice

## 基因篩選之經濟效益

Value of carcass Less the cost of All feed  
屠體價值減去所有飼料成本  
Euro's per pig  
歐元/每頭

|          |          |         |
|----------|----------|---------|
| ➤ JSR    | \$142.71 | \$10.18 |
| ➤ 'UK Co | \$142.65 | \$10.10 |
| ➤ '3     | \$140.41 | \$7.84  |
| ➤ '4     | \$139.90 | \$7.33  |
| ➤ '5     | \$139.00 | \$6.47  |
| ➤ '5     | \$137.10 | \$4.62  |
| ➤ '6     | \$132.57 | \$0.00  |

# Biotechnology

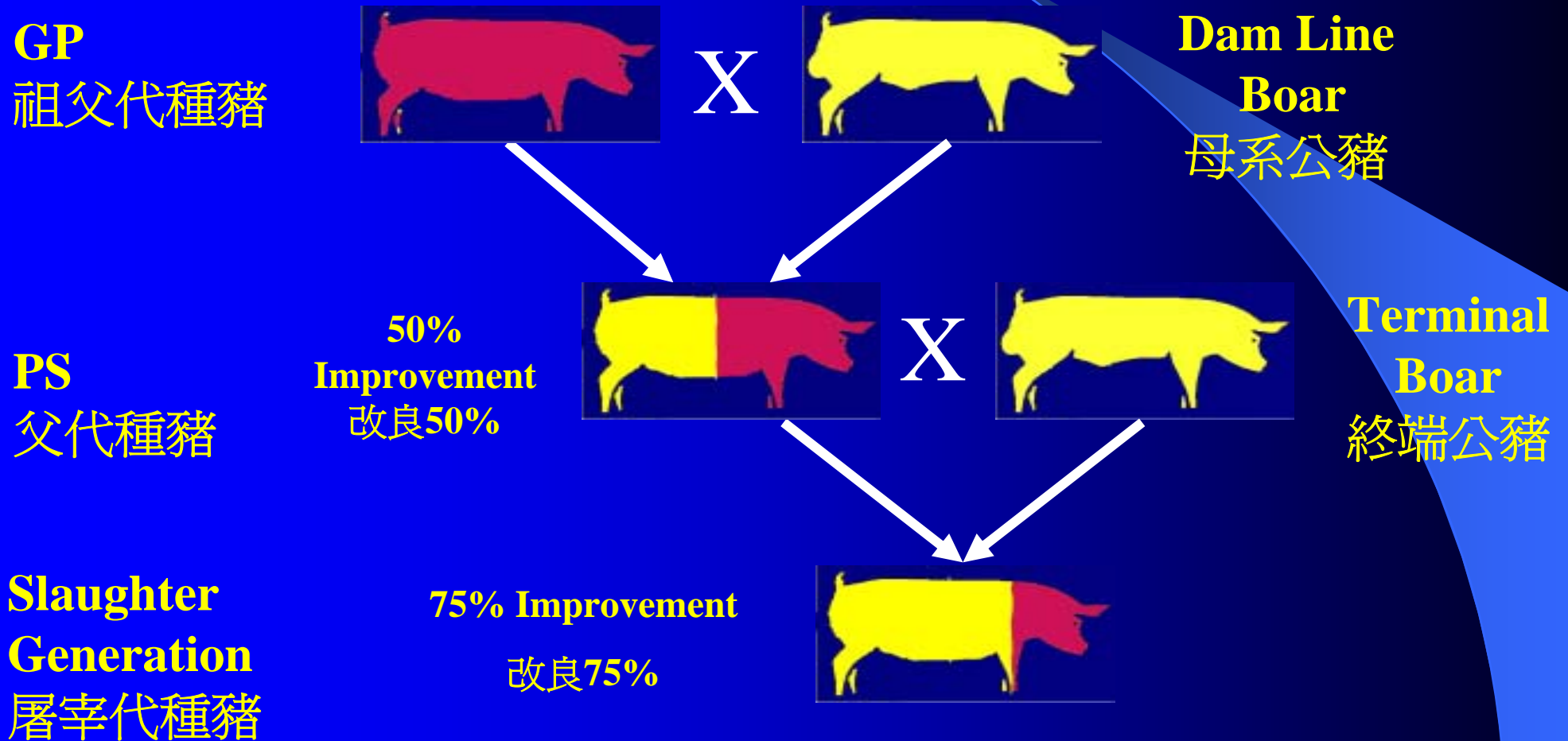
## 生物科技

- Britain at forefront in world research  
英國研究領先全球
  - Roslin Institute 蘇格蘭羅斯林研究所
  - ‘Dolly the sheep’ ‘複製羊桃莉’
- Cloning  
無性繁殖
  - Not important in pig production 在豬隻生產方面不重要
- Genomics  
基因組學
  - Area of significant potential 具重大潛力之領域
- Marker Assisted Selection at GGP level  
在曾祖父代從事標記輔助選育



# Use of AI to enhance the Genetic Potential

利用人工授精強化基因潛能



# Summary

## 總結

- Select genetics from high health source  
從高度健康來源選擇基因
- Select genetics from well run genetic programmes  
從運作良好的基因計劃選擇基因
- Select from companies with good technical backup  
從有良好技術支援的公司選擇基因
- Ensure genetics and nutrition are matched  
務必做到基因與營養相配得宜
- Ensure the pig is what the consumer wants  
務必做到所生產豬隻符合消費者期待
- Ensure well trained and motivated staff  
務必做到員工訓練有素且士氣高昂
- **LASTLY - KNOW YOUR COST PRICE**  
**最後 – 了解您的成本價格**

Thank You!

謝謝！

