



IRISH CATTLE BREEDING FEDERATION

The Theory of Genetics Applied to Livestock Production; Some Experiences from Ireland.

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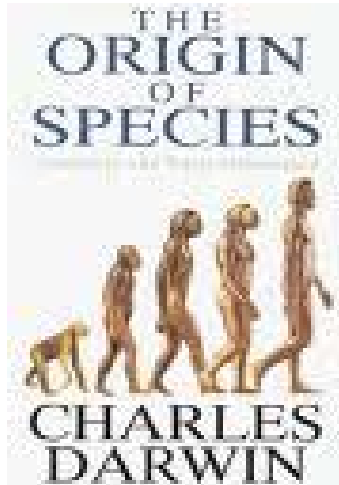
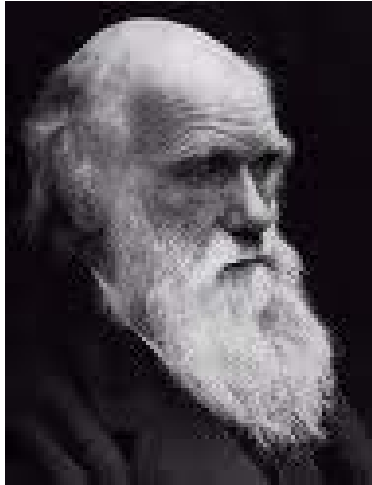


What is a Theory?

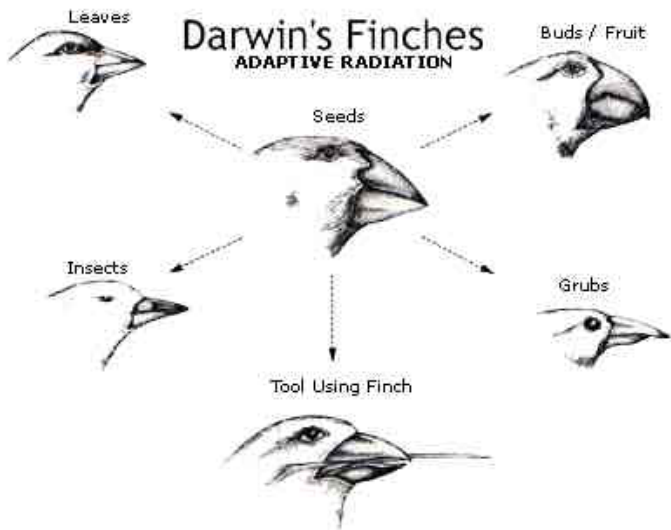
- A frame-work for thinking about a problem/issue:
 - A question of importance.
 - Based on observational data.
 - With a “dynamic principle” – the thing that makes it happen.
 - Using main concepts & sub-concepts.



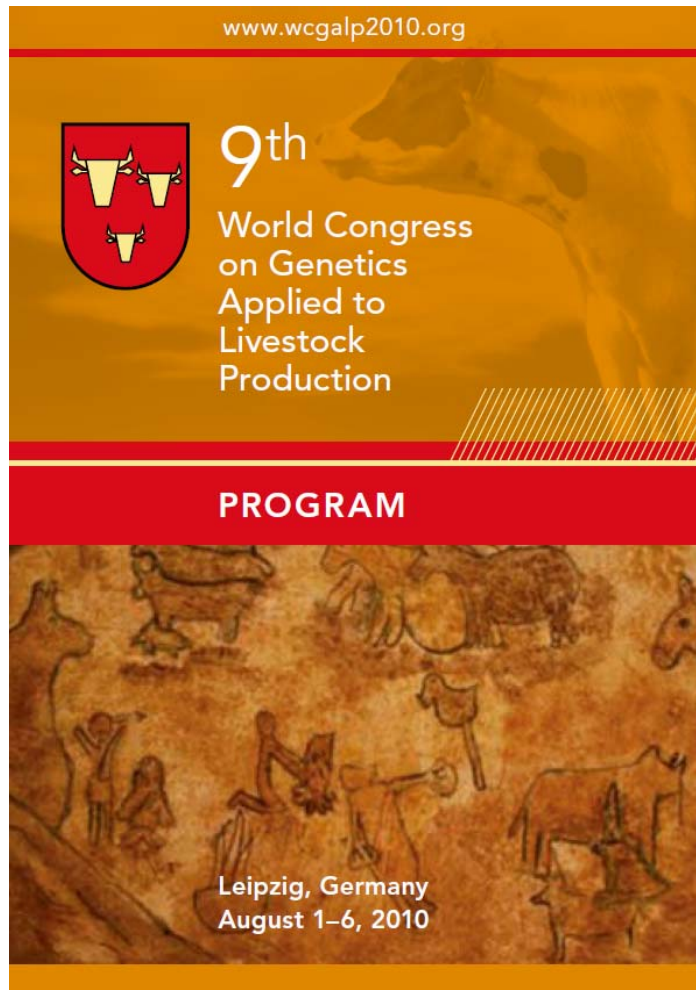
Darwin's Theory of Evolution.



- Question – What is the origin of species?
- Data – 20 years of observational data.
- Dynamic principle – that animals evolve.
- Main concepts - Natural selection, genetic variation, mutation & extinction.
- Darwin built a credible perspective on how life-form existed & evolved.



A Theory of Genetics Applied to Livestock Production.



- Question: How do we achieve genetic gain in livestock production?
 - What is the catalyst – the key driver?
 - What are the main concepts & sub-concepts?
 - Can we consolidate these into an overall framework?

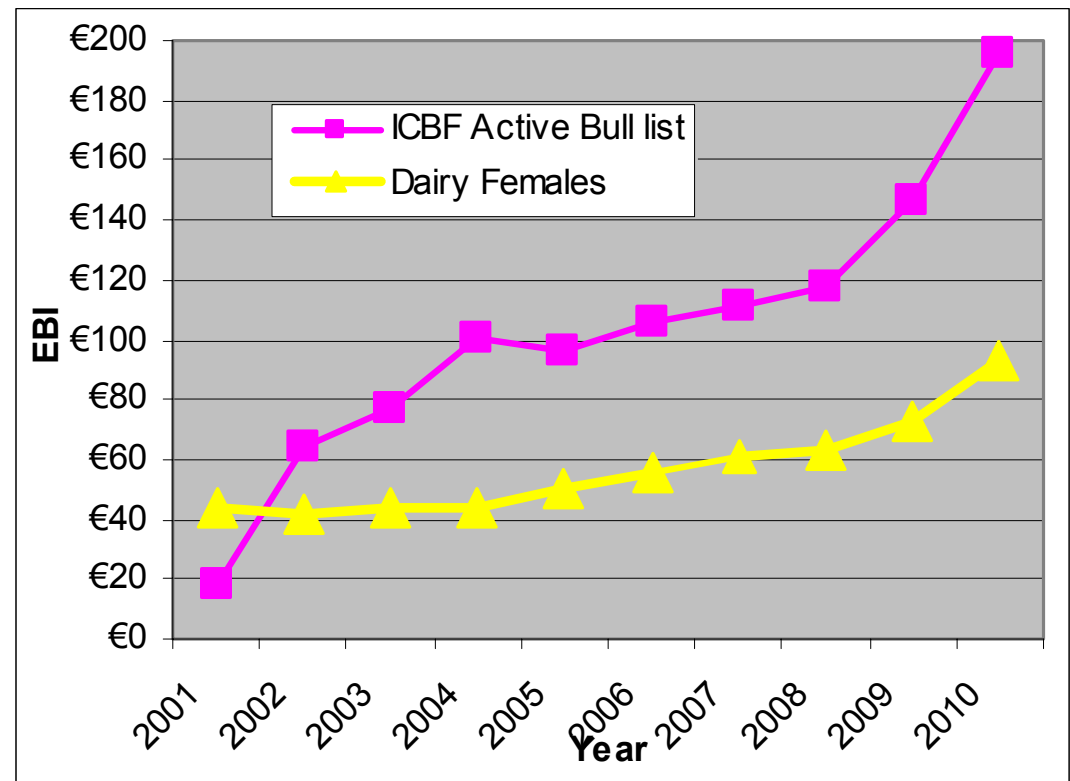
Developing the Theory – Based on observational data.



- Darwin – Finches.
- This theory - 10 years of data from Ireland.
- *Objective: That this theory may be of value to other people and/or industries.*

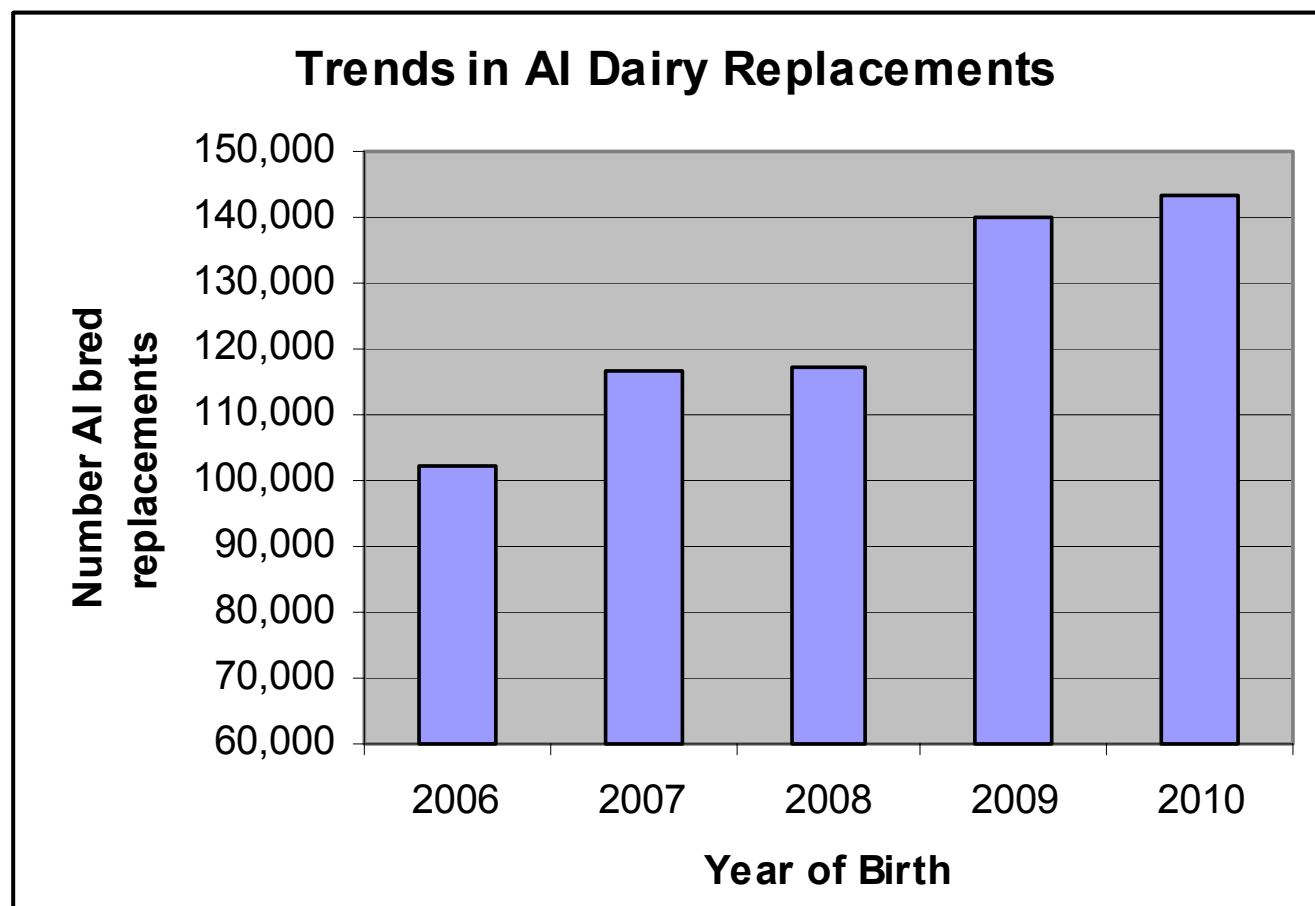
Observational Data; Genetic Gain in Ireland.

- 2001 - Dairy EBI.
 - Screened out “low profit” bulls. Female gain followed.
- 2005 - GEN€ IRELAND
- 2009 - Genomics.
- 10 years - Genetic gain increased from ~€5 to €30/year.
- Worth €350m by 2020.
- Beef Cattle – SBV introduced in 2007. Current gain = €5/year. Similar gains to dairy are possible.



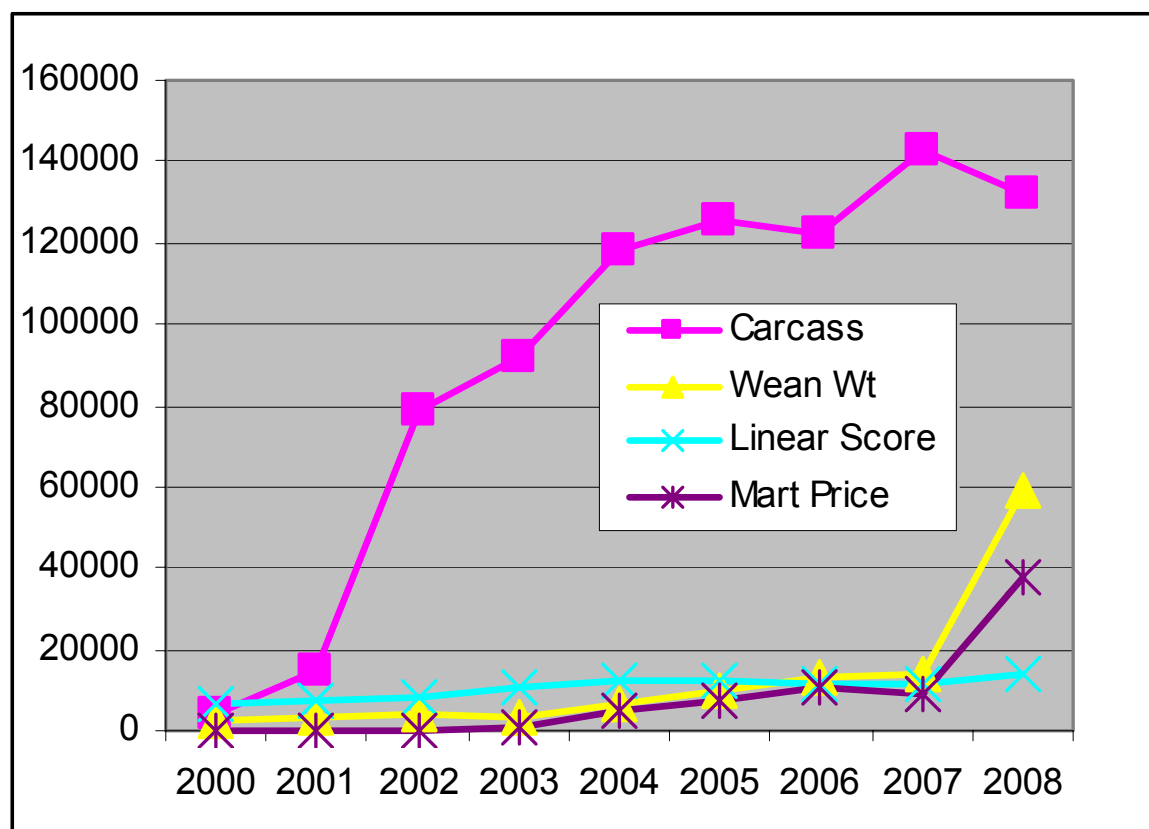
Observational data; Uptake in Services (2005-2010)

- Dairy AI – 8% increase per year.
- Milk recording 5% increase per year.



Observational data; Uptake in data for GE (2001-2008)

- Beef recording
 - large increases in data for genetic evaluation.
 - Industry data is key.



A Model for Achieving Genetic Gain in Cattle Breeding

Key question & dynamic principle

How do we achieve genetic gain in Cattle Breeding?

Catalyst: Industry focused on long-term profit from breeding



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Main Concepts.

Sub-Concepts.

Dynamic Principle – *Long term focus on cattle breeding.*

- ICBF funding in 2009 of €5.4 million.
 - €3.0 m – DAFF & NDP (Structural Funds)
 - €800k – Farmer Tags.
 - €1.6 m – Service fees.
- 70% funding from “industry good”.
- Key relationship with DAFF.
 - Legislation & funding.
- Key relationship with Teagasc.
 - Research, extension, education, benefit in kind.
- Funding & key relationships allow ICBF focus on long-term industry good initiatives.

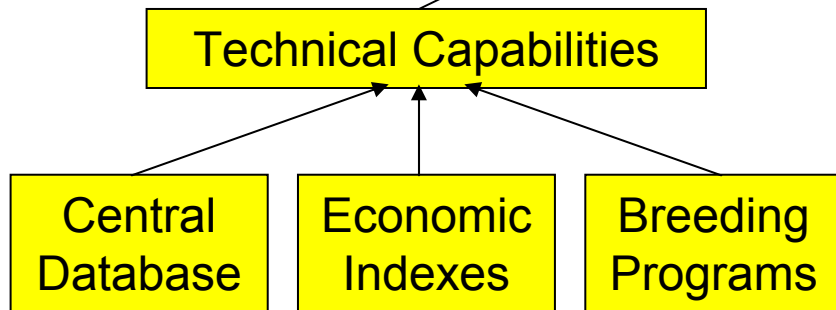
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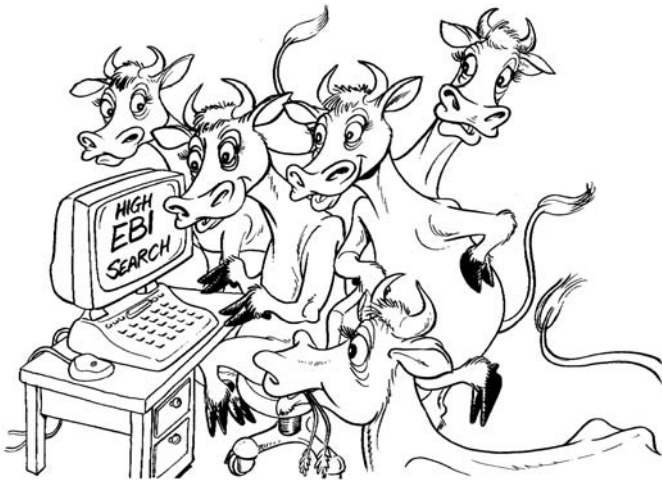


Sub-Concepts.

Main Concept - *Technical Capabilities.*



- Central Database.
 - New technologies, e.g., web-based, PDA's, SMS text.
 - New traits, e.g., carcass data, animal price, feed intake, TB incidence.
- Profit Indexes
 - Indexes based on farm economic models.
 - Use of best methodologies, e.g., statistical models & utilisation of genomics.



Breeding programs.

- Optimal programs for Ireland.
- New technologies & methodologies, e.g., AI handhelds with inbreeding, Sire-Advice, Genomic EBI's for calves & cows.

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Main Concepts.

Technical Capabilities

Central Database

Economic Indexes

Breeding Programs

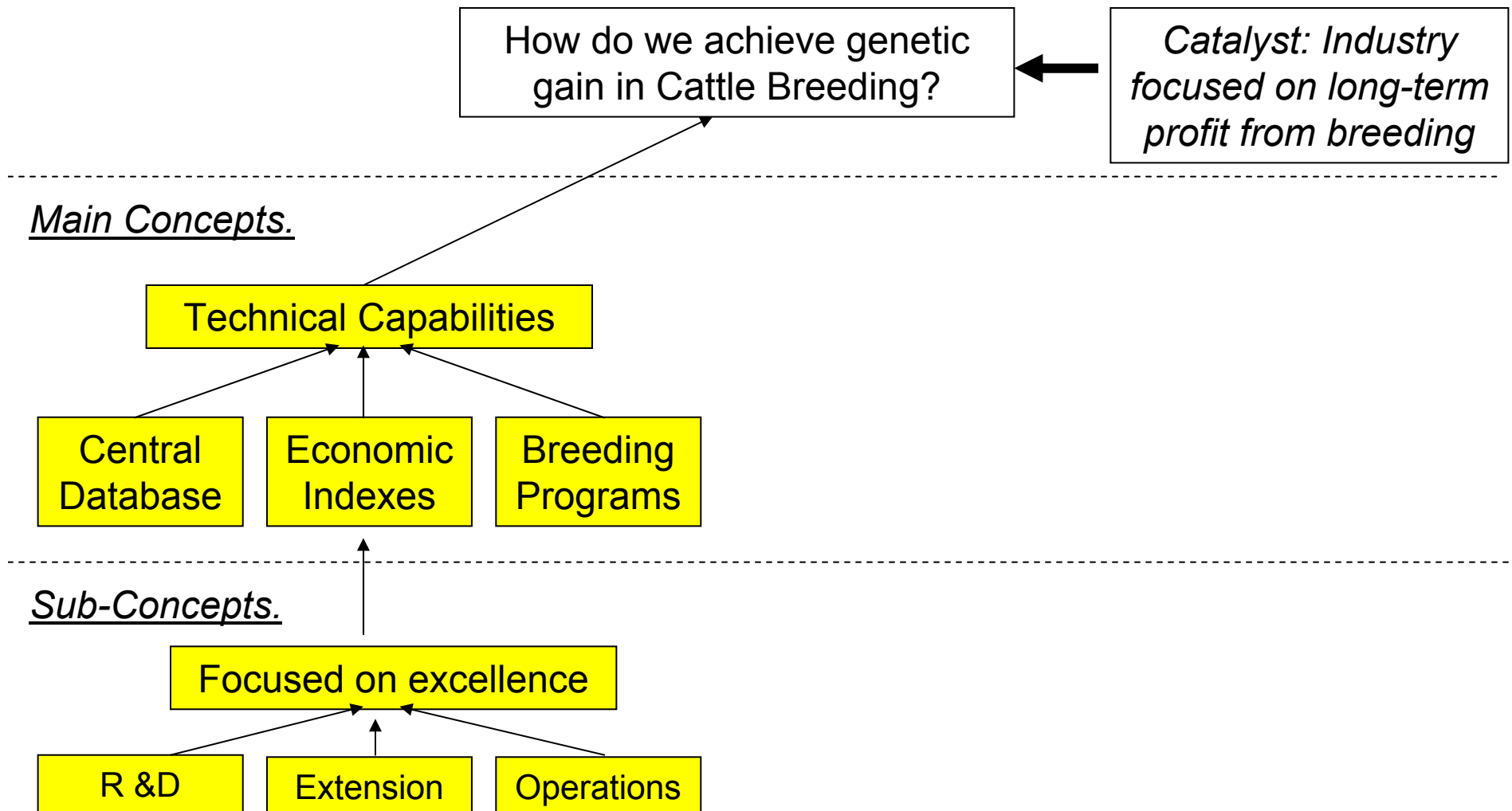
Sub-Concepts.

Focused on excellence

R &D

Extension

Operations



Sub Concept - *Focused on excellence.*



- Research & Development.
 - Relationship with top research groups, e.g., Teagasc, Wageningen, Abacus Bio, Novima, LIC, MTT.....
 - Links with Interbull & ICAR.
 - 12 Irish papers at WCGALP 2010.
- Operations
 - Funnel approach - Projects move from R&D to operations.
- Extension
 - ICBF HerdPlus Service – “Profit from science”.
 - Extension services, e.g., Teagasc, role of discussion groups.

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How do we achieve genetic gain in Cattle Breeding?

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Main Concepts.

Technical Capabilities

Industry Structure

Central Database

Economic Indexes

Breeding Programs

Shared Vision

Committed Funding

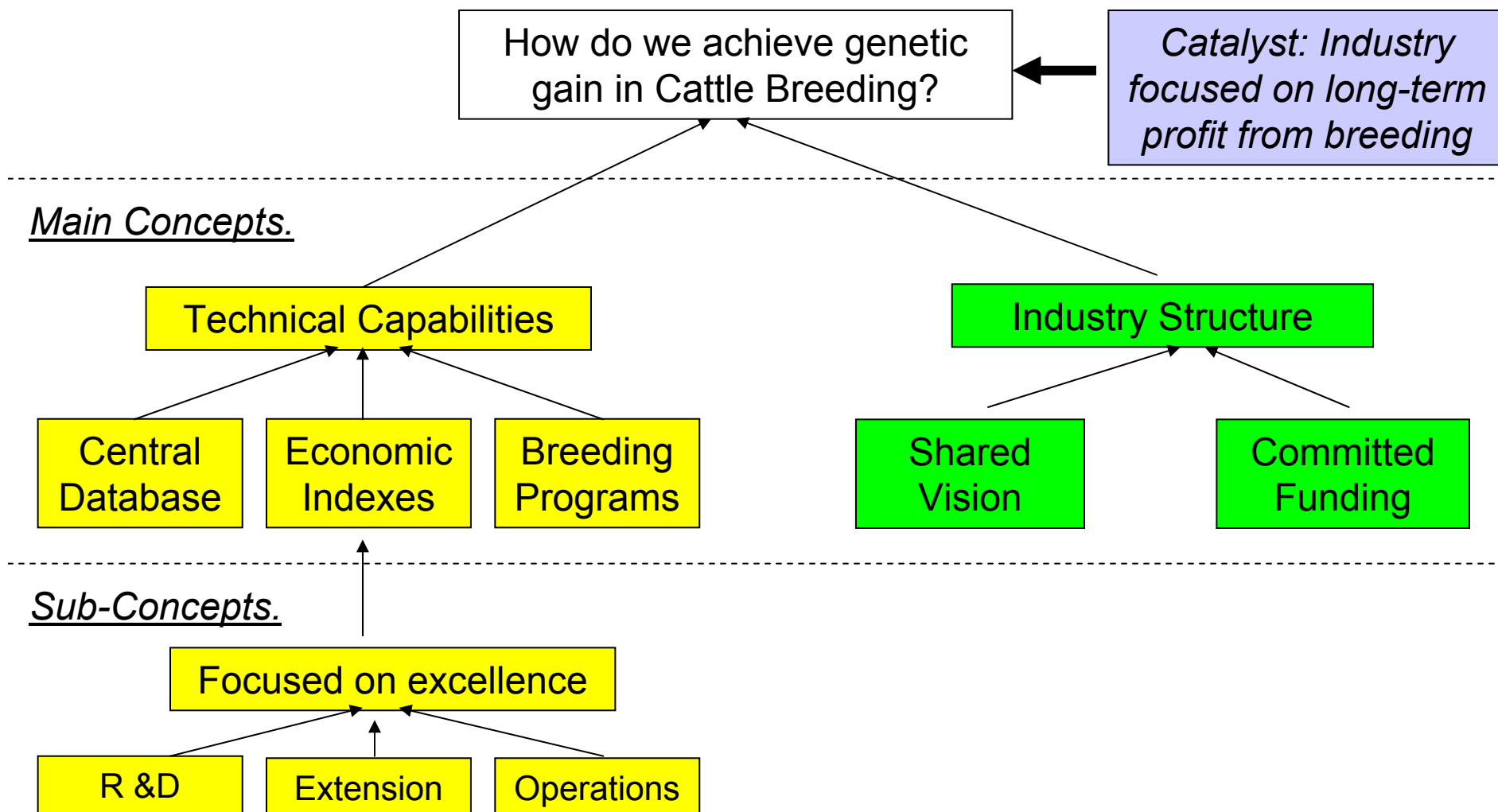
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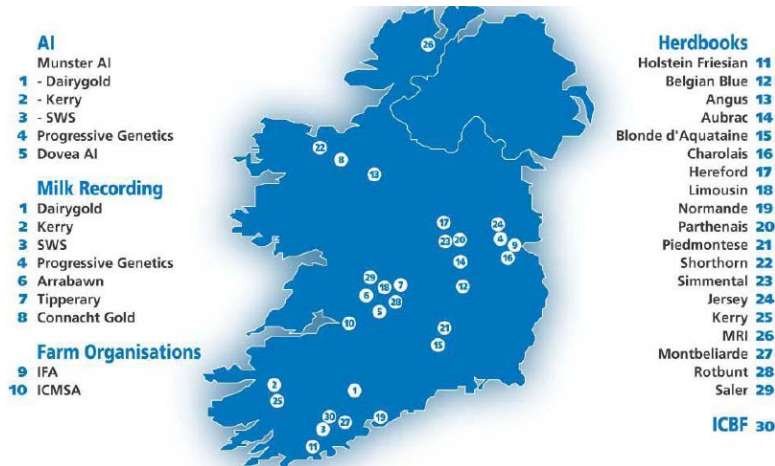
R &D

Extension

Operations



Main Concept - *Industry structure.*



• Shared Vision

– Establishment of ICBF in 2001.

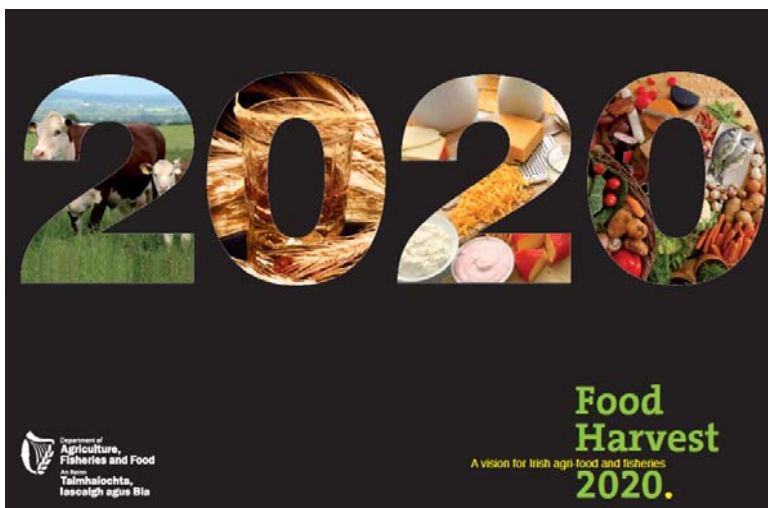
- ~35 people across database, genetics & services.

– Created from over 30 cattle breeding organisations.

- ~500 people employed.

• Committed funding.

- DAFF 2020 Vision document.
- Defined service relationships with shareholders – 5 years.
- Additional income from stakeholders.



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Value cattle breeding

R &D

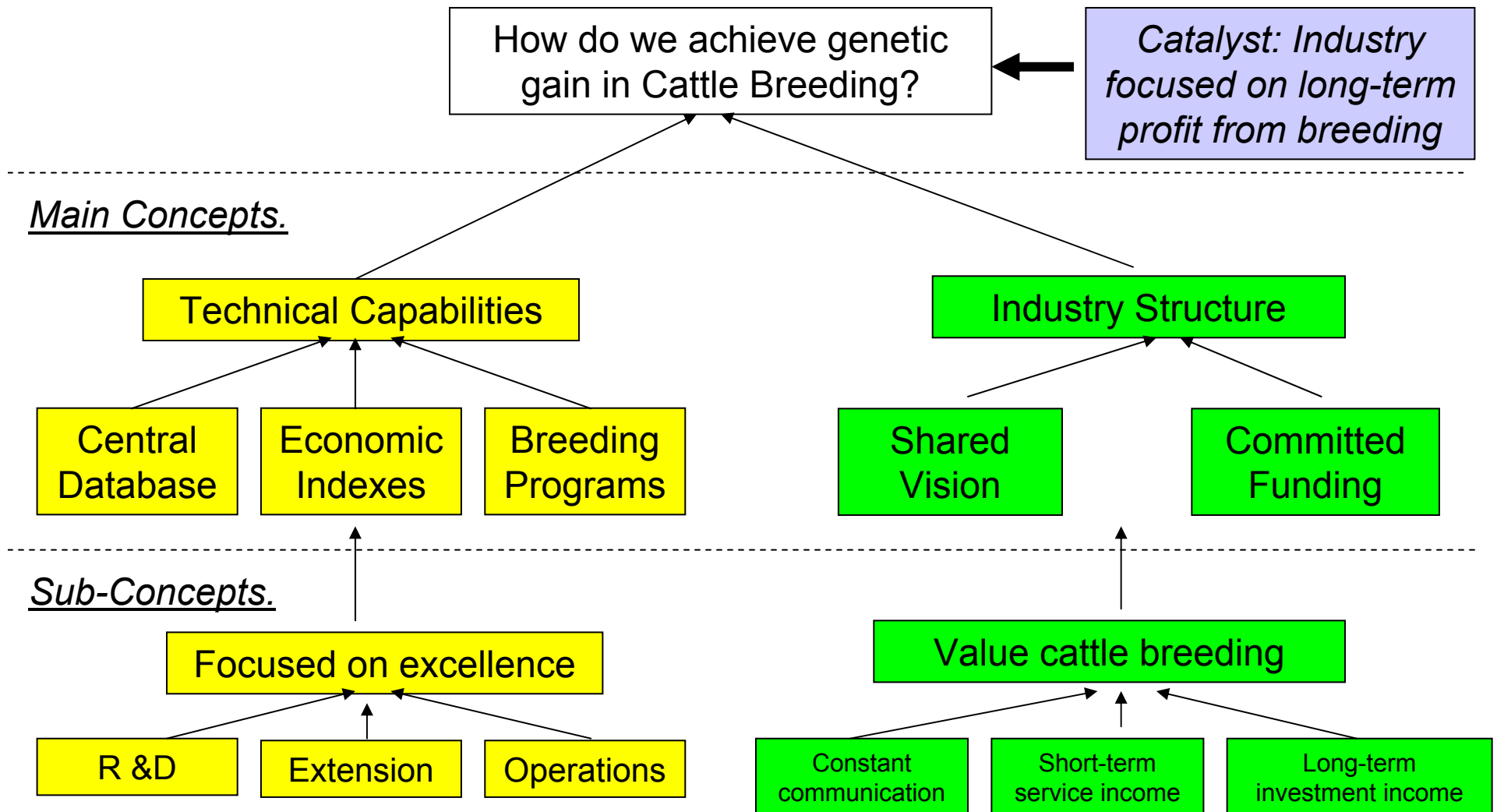
Extension

Operations

Constant communication

Short-term service income

Long-term investment income



Sub Concept – *Value Cattle Breeding.*

26 June 2010 Irish Farmers Journal
Advertiser's announcement

CATTLE BREEDING NEWS

ICBF.com BEST PRACTICE IN CATTLE BREEDING

Dairy herd fertility: trends improving

ANDREW CROMIE
ICBF

THE latest figures from the ICBF database have indicated significant improvements in dairy herd fertility parameters for spring 2010, compared to spring 2009. This is very reassuring, given the downward spiral that there has been in dairy herd fertility over the past 10 years.

The trends are based on data from some 2,500 dairy herds that are involved in ICBF HerdPlus and information on calving and fertility performance.

So what are the trends saying about this economically important trait?

TRENDS IN COMPACT CALVING

Looking at trends in compact calving indicate that the percentage of cows calving in the first three weeks, six weeks and nine weeks of the spring breeding season (for 2010) was 35%, 63% and 60% respectively (Table 1).

has been within the core group of herds, with very little change in the performance of the top 15% of herds, across both years.

These trends also suggest that improvements in technical performance at farm level – as evidenced by more compact calving – have also contributed to the large increase in milk volume supplied by farmers over the past four to six weeks (see article below).

SUBMISSION RATE TRENDS

While calving date information gives us a picture of the current calving season, what can insemination data tell us about next year's calving season?

Although based on a subsample of herds (2,500 of the total 15,000 active dairy herds), the trends are very positive, and indicate major improvements in three week and six week submission rates for the current breeding season (on average, submission rate has increased by 8% in

their dairy systems.

These trends are also supported by trends in the percentage of cows not served 30 days post-calving, which indicate a substantial drop from 40% for cows bred in spring 2009 to 27% for cows bred in spring 2010.

WHY THE IMPROVEMENTS IN FERTILITY?

An obvious question from the very positive trends presented in Table 1 is why the improvements? Clearly there are several contributing factors. These include:

- **Improvements in EBIs:** the 2009 breeding season was the first year that ICBF observed a strong swing towards the use of high EBIs. The progeny of these bulls are now entering dairy herds, and are having a positive effect on fertility performance. This is especially apparent when you consider the improvements in heifer fertility from Table 1.
- **Use of heat detection aids:** a much higher percentage of herds are now using heat detection aids, and, by extension, farmer profitability.

The latest figures from the ICBF database have indicated significant improvements in dairy herd fertility parameters for spring 2010, compared to spring 2009.

evidenced by data from Table 1.

are very positive, it should be remembered that other fertility




- Constant communication.
 - Industry meetings, weekly update, weekly page in Irish Farmers Journal.
- Short-term service income.
 - Prepared to run their services from ICBF database.
- Long-term investment income.
 - Prepared to invest in cattle breeding as it will increase profit for industry.

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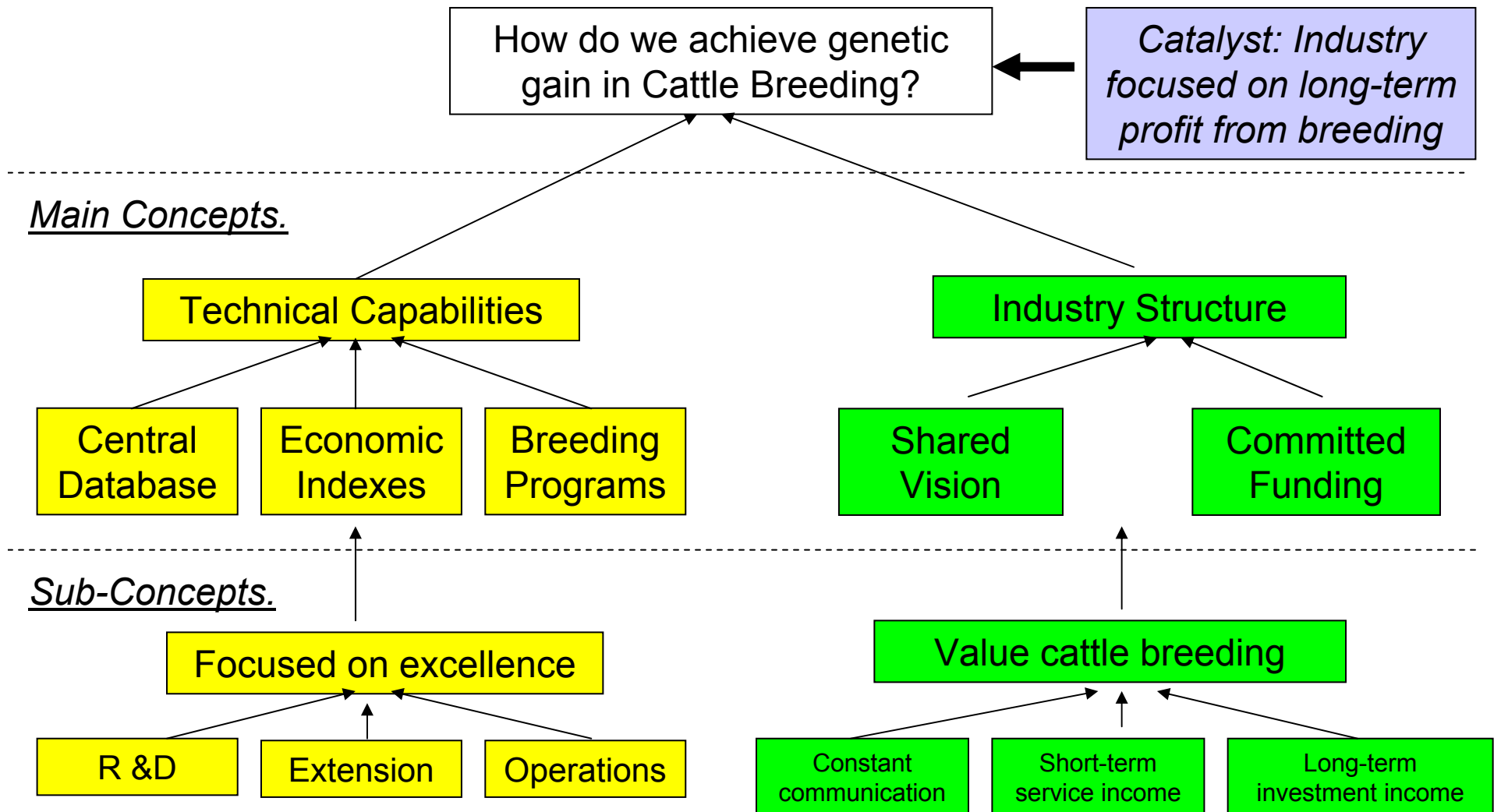
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Long-term investment income



Conclusions

- Genetic gain – often focused on technical developments.
- Industry structure/support also key.
 - Funding for industry good, not short term gain.
- ICBF has focused on both industry structure and technical issues simultaneously.
- Genetic gain and uptake in cattle breeding services has been achieved.
 - Much done....a lot more to do!
 - ICAR 2012. Please come and visit us.
- We hope that this paper will provide a framework for achieving genetic gain for other countries/industries.