NCBC
Dairy Sire Selection

NATIONAL CATTLE BREEDING CENTRE
NCBC Scientific Selection Committee

• To develop a transparent strategy to optimally select young test bulls for the NCBC Dairy Test program

• Ongoing project
Irish Holstein-Friesian Population

International population

“Best” cows

“Best” bulls

Mixed progeny but on average “good”

Elite cows

Fall through the system

Young test sires
Factors to consider

• Population issues: Inbreeding
• Sires of sons
• Bull dams
• Future technology
Inbreeding Trends

Year of Birth

Inbreeding (%)

- HOXFR
- Holstein
- Friesian
Sires of sires

- Less place for computer programming
- Only “active” sires
- Reliability of proofs accounted for by lower usage
- Selected by hand from top 500 AI sires on EBI
- Only Hol/Fr in current model
- PTA for mammary and feet & legs must > -2
- ➔ 84 potential sires of sires
Pedigree Depth

- 0%: Themselves
- 10%: Parents
- 20%: Grandparents
- 30%: Great-Grandparents

Percentage of population

Pedigree

Diagram showing the percentage of population for each level of pedigree:

- 100% for Themselves
- 70% for Parents
- 50% for Grandparents
- 30% for Great-Grandparents
ICBF database
3.25 million females

Must be alive and milk recording

396,529

2 full generations of pedigree

198,146

≥75% Holstein-Friesian
>90% breed fraction known

97,585

>1st parity
Every calving interval <500 days
Average calving interval <400 days

38,412

Age 1st calving <38 months
Lactation length >100

December to April calver
Milk Subindex >€0
Fertility Subinex >€0

4,840
Why not just top EBI

• Top 100 females on EBI
  – 65% RUU
  – 22% OJI

• Top 1000/2000 females on EBI
  – 83% RUU
  – 5% OJI

• Using the proposed method the top 1000 cows have 222 different sires (140 from AI)
Mating program

• Mate every combination
  – EBV production + fertility
  – Type
  – Inbreeding & coancestry
  – EBI (and balance of EBI)

• Linear programming
  – Maximise an objective (EBI + coancestry)
  – Under constraint(s)
    • Number of total matings
    • Number of matings per sire
    • Number of matings per dam (initially 1)

• Tweak & add

Restrict
Conclusions

• Sires of sires selected
• Dams of sires needs more refinements
  – Suggestions?
• Needs to be refined year on year
• Power of genomics in the future
  – Greater accuracy of selection of both dams and calves