

DATA FOR BREEDING PROFITABLE HOLSTEIN FRIESIANS.

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1. ABSTRACT.

The Irish Cattle Breeding Federation (ICBF) has established a shared database to support the cattle breeding decisions of Ireland's dairy and beef industries. This database provides an efficient and comprehensive system for collecting and storing the ancestry and performance data used in the breeding of Holstein Friesians in Ireland. ICBF's genetic evaluation system uses the data, in combination with data from INTER-BULL, to compute a large number of trait evaluations which are combined to give the EBI (Economic Breeding Index). These evaluations are an integral part of the ICBF database.

This paper focuses on the ways Irish dairy farmers, service providers and official registration systems interact with the ICBF database. Particular emphasis is placed on the systems that eliminate duplication of data collection and minimize costs, while facilitating the availability of data from a wide range of sources. The ICBF database also provides an extensive range of information to farmers, breeders, breeding organizations and advisors. This database development has played a major role in enabling Irish dairy farmers to identify the best Holstein Friesians in the world for generating profits under Irish farming conditions.

2. INTRODUCTION.

ICBF commenced operations in 1998, with the objective of achieving the greatest possible genetic improvement in the national cattle herd for the benefit of Irish farmers, the dairy and beef industries and members.

Since its inception, much of ICBF's work has been focused on improving the quantity and quality of data available for cattle breeding. New technologies have been tapped into and business arrangements established, with both shareholders and industry stakeholders alike, with the overall goal of ensuring that Irish farmers have access to high quality information on which to breed more profitable cattle.

In this paper we outline the major developments that have taken place in Ireland over the past 10 years and illustrate the impact these have had on the breeding of Holstein Friesians. Our focus in this paper is on the developments that have impacted on the availability of data for use in creating information used in cattle breeding decisions. These have included: the formation of ICBF, creation of the ICBF Cattle Breeding Database, implementation of the Animal Events data collection system, the creation of linkages with other data collection systems, and the ICBF Genetic Evaluation system. In addition, we provide information on the impact these developments have had on Holstein Friesian breeding decisions in Ireland.

3. THE FORMATION OF ICBF

ICBF's mission is to bring about genetic improvement in the national dairy and beef herd for the benefit of Irish farmers and the wider industry. ICBF was established in 1997 and commenced operations in 1998 with its current structure¹ being finalized in 2000. Its main activities are those associated with: developing the cattle breeding infrastructure in Ireland, operating the cattle breeding database, providing genetic evaluation services, and providing information for cattle breeding decisions.

ICBF is owned by the cattle industry with 18% of shares held by each of the Artificial Insemination (AI), Milk Recording (MR) and Herd Book (HB) sectors and the remaining 46% held by the organizations (IFA & ICMSA) representing farmers. The ICBF Board of 16 comprises persons appointed by the share holders (3 from each of AI, MR and HB, 6 from the farm organizations) and one appointed by the Department of Agriculture Fisheries and Food (DAFF²).

4. CREATION OF THE ICBF CATTLE BREEDING DATABASE

At the time ICBF was formed there were a large number of separate computer systems supporting aspects of cattle breeding in Ireland. Each had its own data collection system and supported the information needs of one or other aspect of the cattle breeding industry. For example, each Herd Book (there were 18 at that time) had their own system, each Milk Recording organization (there were 8 in 1998) had its own system, and DAFF operated separate systems for genetic evaluations and the official calf registration and cattle movement monitoring system (CMMS). These systems used a different animal identification and held limited cross references.

ICBF established its cattle breeding database using the IRIS³ software system from the Dutch Cattle Breeding organisation NRS. Creating the database involved an enormous effort to: negotiate agreements for the sharing of data, to establish shared data collection systems (see below for details) and to consolidate the existing computer files into a single shared database. ICBF established a team of information technology developers, supported by a number of contractors, to customize IRIS to meet the needs of the Irish breeding industry. This customization has now reached the point where the ICBF database requires little support from NRS.

The ICBF cattle breeding database supports, through the use of a range of new technologies⁴, the information needs of milk recording, herd books, AI organizations and cattle farmers. Farmers are able to access their own data in the database through the web.

5. IMPLEMENTATION OF THE ANIMAL EVENTS DATA COLLECTION SYSTEM

The Animal Events (AE) data collection system was developed, as part of the overall database development, to replace the overlapping data collection systems operating in 1998. This system was built to remove duplication in data collection (at farm and organization levels) and to ensure all the data required for cattle breeding (and other official purposes) was collected efficiently and accurately.

The AE system collects data on those cattle breeding events (calving, birth, identification, mating, etc. which are known only to the farmer. Both paper and electronic systems are supported. The data collected in this way is accessible to those participating organizations that provide cattle breeding services to the herd.

The AE system has revolutionized cattle breeding data collection in Ireland.

The ICBF database has been fully operational for dairy, beef, milk recording, beef performance recording, genetic evaluations and herd books since 2005. Some 30,000 herds, with 1.1 million calvings (representing half of the Irish cattle herd) were participating in one or more aspects of the database by the end of 2007 (Table 1). Indeed, the number of herds involved in the ICBF database has more than doubled in the past few months (over 60,000 herds are now involved), with the launch of the new “Animal Welfare, Recording and Breeding Scheme for Suckler Cows” by DAFF and the Irish beef industry. A key component of this scheme is the recording of all relevant “Animal Events” data through the ICBF cattle breeding database.

Table 1. A comparison of the level of performance recording in Ireland (2001 vs. 2007).

Data flows	2001*	2007	Ratio of 2007 to 2001
Department of Agriculture (DAFF)			
- CMMS Births	0	1,111,569	New data
- Slaughter records	2,450	756,911	309
ICBF Animal Events/HerdPlus			
- Animal Event Births	0	606,326	New data
- Pedigree birth registrations	85,416	87,832	1.03
- Calving performance	18,183	478,234	26.3
- DIY AI serves	0	156,651	New data
- On-farm linear scoring	9,809	14,362	1.46
- On-farm weight recording	6,039	7,863	1.30
- Farmer mart weight recording	0	159,231	New data
Herdbooks			
- Dairy linear scoring	15,386	23,329	1.52
Milk Recording Organisations			
- Milk recording	336,868	428,170	1.27
AI Companies			
- Technician serves	18,183	498,073	18.8

* Data recorded via AI, progeny test, herdbook & milk recording systems

The trends in data recording over the past 6 years (Table 1) indicate a dramatic increase in the quantity and quality of data available for cattle breeding as result of the establishment of the central database. For example, the number of calving performance events recorded in 2001 (via the National AI progeny test program) was 18,183, compared to 478,234 in 2007, an increase of 26.3 times. Similar trends are apparent for other traits, most notably slaughter records, which have increased by a factor of 309 times. Historically these records (including data for milk recording, linear scoring & weight recording) were collected as part of the services provided to Irish farmers through the National progeny test program and/or herdbook, and/or milk recording services. Each of these services had their own separate system resulting in much duplication by farmers and the industry.

6. LINKAGES WITH OTHER DATA COLLECTION SYSTEMS.

The ICBF database has access to data collected by a wide range of organizations for other purposes. The data collected and stored in the ICBF database from these other sources, primarily facilitated by DAFF, includes:

- Calf registrations through DAFF – all calves born in Ireland are first registered by DAFF albeit based on data provided by farmers through the Animal Events system, and only then added to the ICBF database. This ensures the official EU identification is available for all calves entering the ICBF database.
- Cattle movements, exports and deaths through CMMS – this eliminates the need for any of the cattle breeding organizations to collect this data.
- Slaughter data from meat processing plants in Ireland.
- Sale data from Marts.
- Milk records from Milk Recording organizations. The ICBF database is an integral part of the milk recording and result reporting process that operates in Ireland.
- Artificial inseminations recorded by technicians. ICBF has developed a hand-held computer system that links directly to the ICBF database for insemination recording. This system is used by all the main AI companies operating in Ireland.
- Linear scoring (dairy and beef) and weight recording services. The same handheld technology used for AI technicians is provided by ICBF for linear scoring (and classification) services.

These linkages ensure that neither farmers nor organizations are faced with duplicated effort in collecting data that has already been collected for another purpose.

7. THE ICBF GENETIC EVALUATION SYSTEM

ICBF operates the genetic evaluation system for both dairy and beef cattle breeding in Ireland. This system operates in close association with the ICBF database and is also a full participant in the activities of Interbull, the international dairy genetic evaluation organisation.

The objective that has been established for Irish dairy cattle breeding is farm profit. This is supported by the Economic Breeding Index which was first introduced in 2001 and has continued to evolve as to take account of new research, new and improved sources of data and changing economic circumstances. In its current (2008) form the EBI is the sum of five economic sub-indexes covering milk, fertility, calving, beef and health.

The EBI, and all the sub-index information, is computed from Irish data and genetic evaluation data from other countries provided through Interbull. In this way Irish breeders are able to obtain EBI and other genetic evaluation information on Holstein Friesian bulls tested worldwide. The resulting evaluations are stored in the ICBF database and from there are available for publication and use in services to herd owners.

8. IMPACT ON HOLSTEIN FRIESIAN BREEDING IN IRELAND

The impact of ICBF's efforts can be assessed from trends in the Holstein Friesian bulls being used in AI, as illustrated in figures 1 to 6 ⁵, for the traits having greatest impact on profitability under Irish farming conditions. These show a dramatic and rapid response to the availability of the EBI. The changes over the last ten years are all in a desirable direction. That is, increased production of milk solids, more concentrated milk, increased fertility and improved survival. Previous undesirable trends in fertility and survival have been reversed.

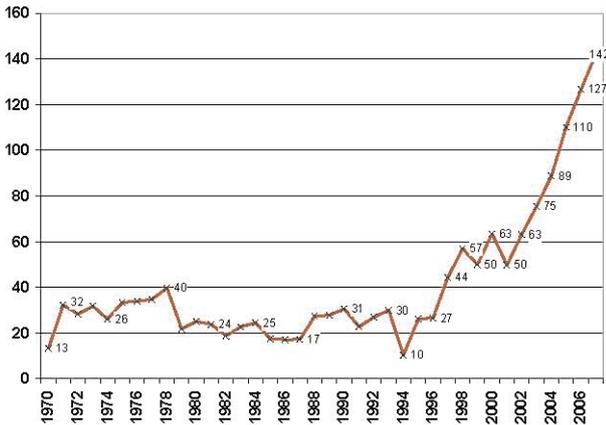


Figure 1. Trend in average EBI of Holstein Friesian bulls registered for use in AI, by year of birth.

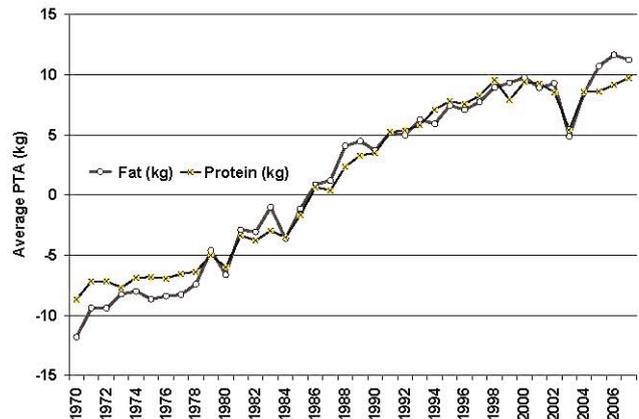


Figure 2. Trend in average PTA for fat (kg) and protein (kg).

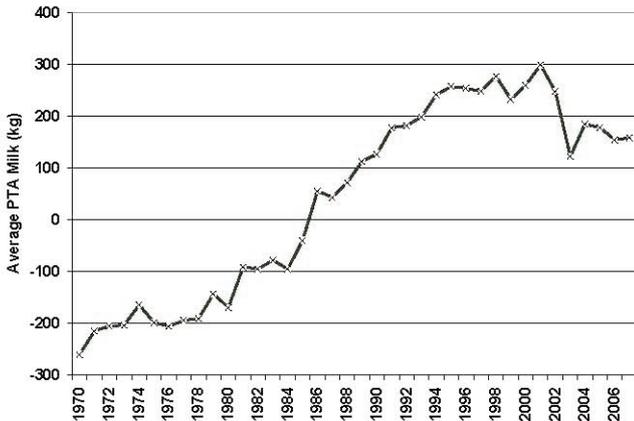


Figure 3. Trend in average PTA for milk weight (kg).

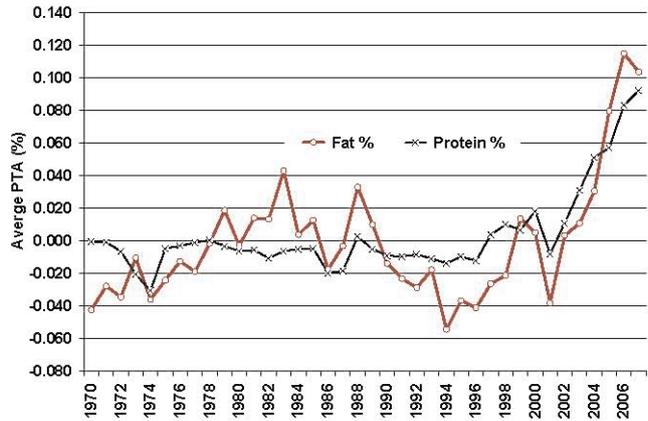


Figure 4. Trend in average PTA for fat % and protein %.

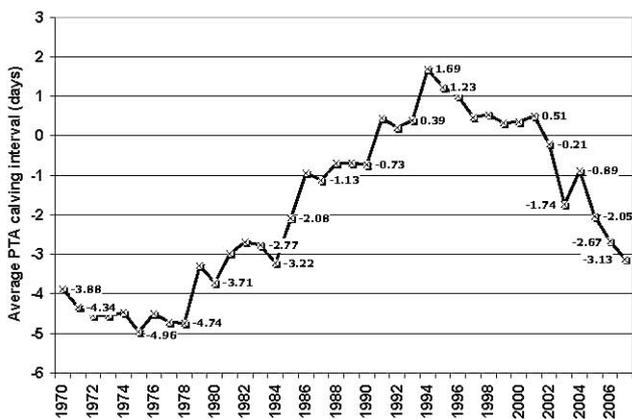


Figure 5. Fertility - Trend in average PTA for calving interval (days).

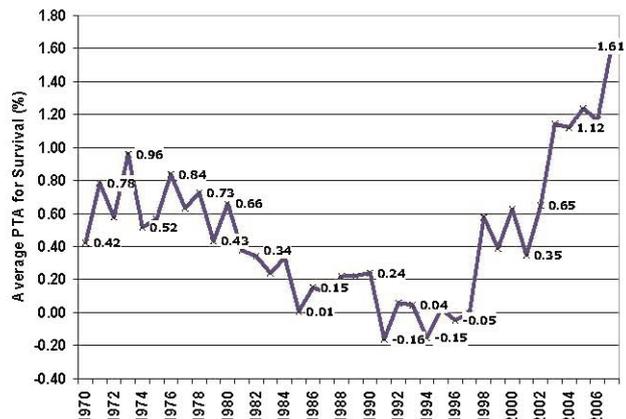


Figure 6. Trend in PTA for survival (%).

9. SUMMARY

In the last ten years the Irish cattle breeding industry has undergone a complete redevelopment of its data gathering infrastructure. The key developments include:

- the establishment of ICBF as a working partnership between the organizations involved in Irish cattle breeding
- the establishment of a shared cattle breeding database
- the implementation of data collection and sharing system that eliminates duplication at farm and organization level
- development of a genetic evaluation system which identifies, on a worldwide basis, those cattle that are most profitable under Irish conditions.

Irish farmers using Holstein Friesians and AI Companies supplying Holstein Friesian semen have responded by making good use of the information now available to breed more profitable cattle, better suited to Irish farming conditions.

1 <http://www.icbf.com/aboutus/structure.php>

2 <http://www.agriculture.gov.ie/>

3 A subsidiary of CRV Holdings – website <http://ais.cr-delta.nl/>

4 Cromie A, Wickham B, Coughlan S, & M Burke, 2008. The impact of new technologies on performance recording and genetic evaluation of dairy and beef cattle in Ireland. Proceedings ICAR Biennial Conference, Niagara, June 2008.

5 http://www.icbf.com/publications/files/Report_May_2008_ver_7.pdf