

A BRIEF STUDY & ANALYSIS OF THE PROBLEMS CONFRONTING BREED SOCIETIES WHEN CONSIDERING THE FACTORS OF PURITY & PEDIGREE

Introduction.

I had been considering, for some time, putting my thoughts on this subject down in writing. I was finally determined to do this after I had been involved in a somewhat heated discussion with another Hereford breeder at a recent Cattle Show. It was very apparent from the views expressed by this person, that he, together with many other current leading Hereford breeders, no longer considered the purity of the Breed to be of more than a passing interest and of little importance. Further, the fact that the Breed may have been and may continue to be the subject of the infusion of the genetics of other breeds, without the clear knowledge and agreement of the members of the Hereford Cattle Society, was considered by him to be of negligible concern or significance and probably commercially a good thing.

In this study, I have broadly directed my analysis to those factors affecting Hereford cattle, a breed with which, as a breeder, I have been involved for some 30 years or so.

Although some of the factors affecting Hereford cattle may not have apparent or immediate relevance to other cattle breeds, they will for many, but in any event they should be of interest to the members of other Breed Societies and to cattle breeders generally.

I do not intend to investigate the history and development of the Hereford breed during the 18th, 19th and early 20th centuries. This has been done very well, extensively and with great indigenous knowledge, by others.

I believe it is correct to suggest that most people, if asked the question, "do you think that pedigree and purity are the same thing?" or that "a pedigree animal would be a pure animal?" From my experience, they would answer, "Yes", to both of these questions.

Of course, it is clear that this is not the case. In the legal sense, the definition of 'pure', is clearly defined by the laws of the EU in the Zootech Regulations. Thus a pedigree animal can be said officially to be "purebred" if it is 94% bred of the Original Population for a female and 97% of the Original Population if it is a male and in an **Open Herd**

Book.

The Hereford Cattle Society has run a **Closed Herd Book** for over 130 years, and has officially regulated all importations into this country including Poll Hereford cattle in 1956 under the 1953 World Council Agreement. Surely then, the measure of purity should, realistically, be within the genetic possibilities governed by the laws of inheritance, and always verified by the latest scientific tests available today.

In the end does 'Purity' really matter? I believe it does. It matters not only as being compliant with the 'Law of the Land' but also as a measure of the integrity of the Breed. It also matters for good practical reasons in the breeding of cattle and particularly in the understanding of what the probable outcome may be when breeding Pedigree animals or in the results of using pedigree animals for cross breeding purposes. A good starting point and the measure of the integrity of the Hereford Cattle Society should be, the statement made in the founding "Objects of the Memorandum of Association of the Society". (the Hereford Herd Book Society)

This states its main objective as, "To maintain unimpaired the **Purity**(*my emphasis*) and improve the Breed of cattle known as Herefords, and to promote impartially the breeding of all the various tribes, families, and strain, of such cattle"

This statement remains unchanged today in the current Memorandum of Association of the Hereford Cattle Society.

We should now ask what is the purpose of this foundation statement? Surely, it is, without doubt, a statement of definitive intent. If this is true, then does it still have that full authority today?

It is here where I start to have doubt. In the last year, the 'Founding Objects' were quoted to me in a letter from the Society. It was as if by quoting the 'Founding Objects', it meant that action was being taken to ascertain and guarantee the purity of the Hereford Breed. Those with responsibility for this, maintain that they are and always have discharged this responsibility judiciously. This, despite mounting evidence showing that by the use of modern genetic analysis there are unexplained alterations in the genetic profiles in those cattle bred from Herefords imported from North America. In a recent letter I received from the Council of the Society, they stated with regard to the Founding Objects, 'First and foremost the Council wished to point out they are fully aware of their duties in **managing** (*my emphasis*) the main object for which the Society is established'.

And then,

"I believe the opinion of the Council relating to DNA study in relation to identifying the various strains of Herefords or creation of any studs group has already been made. They can see no added benefit to the Breed in carrying out such research, plus the effect of such a move appearing to be **divisive**." (*my emphasis*)

Thus, the Council of the Society makes its position perfectly clear. The 'Founding Objects', can be 'managed' expediently. They are against the discovery of the truth about 'purity' or of the genetic makeup of the Breed. They are effectively subverting the truth, that a Breed once of great purity is no longer 'pure bred'. Why does the Council wish to keep this secret? Is the statement that the breed has certain 'stud groups' an admission that the Breed has been 'hybridised' using certain male lines.

My broader consideration starts with the creation of the first Herd Book in 1846. Then in 1878 The Hereford Herd Book Society was formed. In 1886 The Herd Book was 'Closed' to any entries other than those descended from animals registered in the Herd Book of 1878. That is, Herd Books 1 and 16.

The fact that the Herd Book was closed, was and is of great relevance. (Note the USA Hereford Association closed the Herd Book to imported cattle at Herd Book 13 in 1882).

The closure of the Herd Book 15 in 1886 meant that from that time forward, no animal could be registered in any future Herd Books, unless it could show definitively that it could trace the ancestry of its Sire and Dam, without external intervention, back to a Sire and Dam registered in that closed 1886 Herd Book and thus to the 1878 Herd Book. Further and very importantly, this gave any future purchaser of Hereford cattle an absolute promise. That promise was and should be, that a Pedigree Certificate issued by the Hereford Herd Book Society (now The Hereford Cattle Society) provided a guarantee of the Purity of the animal being purchased. It certainly gave no implicit or explicit permission for the introduction of the genetics of any other breed, or of non-registered pedigree Hereford cattle in any percentage, into the pedigree of the Hereford.

We know that historically, Hereford cattle were exported to many countries around the world. Probably the most important area and certainly that which in more recent times has had the greatest effect on the Hereford Breed, was and is North America. The continent of North America that is America and Canada, could be considered as one constituency, as pedigrees and breeding between the two was interchangeable. Here, we saw the appearance of Poll Herefords, developed by crossing with Red Poll or Poll Shorthorn bulls. Initially these were registered as a separate Breed. In more recent times, we have seen the emergence of animals of very substantially increased height, size and changed type and of more variable appearance.



100 years between & little changed



**Bull 'Sailor Prince' & Two Heifers
1908**



**Original Population Heifer
at 2 years. 2008**

It is, I believe, important that we understand the pressures for change that are, over the years, exerted on cattle breeders and therefore on any Cattle Society of which they are members. At any time, these pressures will reflect the perceived or actual need to change cattle, to coincide with the then governing opinions, fashions and the requirements of the commercial markets and to, what should be to a lesser extent, the show ring.

The cattle breeder needs to survive and to prosper. This need will inevitably tend to drive the cattle breeder to make the decision to abandon the type of cattle then being bred or substantially to modify them. Rightly or wrongly this commercial imperative will often be the driving force beyond all others.

It is clear that within the genetic make-up of almost any cattle breed, there is an ability, over time, to change the size and type of the animals being bred and to do so without losing the valued characteristics and virtues of the breed.

However, it is also clear that there are realistic limits, within any breed, to the extent of this process of change, without the loss or compromise of existing desirable traits and characteristics. Also, even with the process of enhanced generational breeding, changes made still take several generations to become established.

In view of this, many Breed Societies and breeders have concluded that change can be achieved more speedily and effectively, through the introduction of genetic material from another apparently desirable breed. As to whether or not this so called 'grading-up' is a desirable process, I will not comment but the tendency, at any time, to create all breeds with similar characteristics, seems to me to defeat the purpose and value of breed variation and utility and to potentially limit the future diversity available in the genetic pool.

Initially, of course, breeders often see the benefits of hybrid vigour through this cross breeding process but these benefits are finite and diminish over time.

Nevertheless, if such a process is properly agreed by the members of a breed Society, together with the introduction of a separate grading-up register, then reasonably, it at least has some validity.

However, the question that should then be asked of a Breed Society is, 'how have you treated or dealt with or do you intend to treat or deal with members and their registered cattle who have not been participant in the 'grading up' process, and whose animals remain effectively 'pure' and genetically consistent with the Original Population but are now genetically different from the graded up population"? Is it not a Breed Society's responsibility to protect and support this original genetic resource?.(Ref: *Upgrading?.. Gill-Alderson-Glossop-Walters-1997*)

WESTWOOD POSTMAN

1980 Royal Show Winner



AN ORIGINAL POPULATION HEREFORD Frame Size 5.5

REMITTAL MONARCH

1981 Royal Show Winner



A NORTH AMERICAN IMPORTED 'POLL'. Frame Size 7

In the case of the Hereford Breed, the very substantial changes that have taken place over the last 30 to 40 years or so, to the size, type and characteristics of Hereford cattle in the UK, have all been brought about through the importation of stock, embryos or semen directly or indirectly originating from North America.

It is, surely, at those times when extreme commercial and both internal and external pressures bear down on breeders, to change substantially the type of stock being bred, that the paramount duty of a Breed Society is to make certain that those changes are achieved through careful selection and breeding programmes from within the breed genetics in the UK. The Breed Society needs to adopt the precautionary principle and provide all the proper monitoring of the resulting progeny to protect and safeguard its Original Population's genetics

For the Hereford Breed, the ability of the Cattle Society to protect against the possibility of changes being achieved other than by intra breed selection and breeding programmes, was compromised by the 1953 worldwide reciprocal pedigree agreement.

This Agreement was made by men of integrity who wished to protect the Breed and bring the Breed together worldwide. Unfortunately, it is clear that this agreement created a pathway to the potential for expedient decision making in the Cattle Society and by some worldwide breeders, leading to the compromise of the Purity of the Breed and, of course, a sales bonanza for North American breeders.

It is well documented that some breeders over the past 30 years had drawn attention to and publicly voiced their concerns about the nature and characteristics of the cattle being imported from North America. Almost without exception, their concerns were disregarded, treated with disdain or considered as having no validity, by the Council of the Cattle Society and its Secretariat.

As the numbers of imported North American stock accelerated, so the numbers of the pure bred original population British stock declined. In the late 1980s and early 1990s the numbers of original British breeding females had reduced precipitously to about 250.

It became increasingly apparent that the Original Population genetically pure Hereford cattle were becoming an inconvenient embarrassment to those members of the Society and the Council, involved with the headlong importation of North American stock. There was obviously an implicit willingness in the Society to condone the catastrophic decline in the number of named female family lines. There were 84 female family lines in existence at the close of Herd Book 16, whereas today there are only 22. Nearly all the loss of female diversity occurring from 1970s onwards. Although, catastrophically, 15 female families have been lost since 1994. What does that say about the attitude of the Hereford Cattle Society to its Original Population.

There were even discussions that considered allowing the destruction of the large store of frozen semen, collected from top original population bulls in the 1950s, 1960s and 1970s. and the huge store of genetic diversity stored within this semen.

We have to remember that at that time the ability of the Cattle Society properly to investigate whether or not the Hereford cattle being imported from North America, were in fact 'pure,' or what portion of the genome contained genetic material from other non-Hereford breeds, was somewhat limited.

DNA and genetic analysis was then, for bovines, somewhat in its infancy and expensive. Such tests as were then conducted, relied on blood typing. This was not as robust a system as current DNA analysis. It is able to determine that the Sire and Dam are who they say they are but is unable to determine whether or not they belong to a specific breed.

Thus the somewhat convenient but naïve fall-back position of relying on the honesty and integrity of the North American breeders 'pedigrees' and the 1953 reciprocal pedigree agreement.

In the late 1980s and early 1990s, the Hereford Cattle Society was offered the opportunity to become a partner in the investigation and research into the DNA make up of Hereford cattle. Sadly, this offer was declined.

Nevertheless, thanks to the foresight, and generosity of a long term Hereford breeder, Michael Symonds, a research programme was instituted. This research using blood samples, was carried out for the Traditional Hereford Breeders Club (THBC). The results were presented to the THBC and then to the Hereford Cattle Society. However, despite the revealing nature of this early study, the Hereford Cattle Society decided to ignore the implications of the findings, although it could and should have been used to challenge the integrity of certain breeding animals.

The Hereford Cattle Society would only recognise Traditional Herefords "As containing no imported bloodlines" and not as the stock of the 'Original Population' genetics.

(ref:1998 Blott et al, Genetic variation within the Hereford breed of cattle. Animal Genetics 29:202-211)

Science does not stand still, and in the years between 2000 and 2015 research into the makeup and understanding of bovine DNA accelerated.

Two events brought this into the public domain.

Defra/FSA in response to the scandal involving the sale of 'beef' 'products containing horsemeat and the consistent and deceitful mis-labelling of the breed origins of beef, instituted a programme of DNA research. This research was to be carried out by the Royal Zoological Society of Scotland (RZSS).

The purpose was that this research, which benefited from in-depth work already carried out by J. Taylor from The University of Missouri, would provide clearly identifiable DNA markers that could be used, at a practical level, to determine the breed origins of the beef product being examined.

1.(Ref: Q011030. 2011)

Unexpectedly for the researchers the preliminary results identified not one but two distinct groups of Hereford cattle. These were, the Original Population Herefords and those Herefords of imported North American origin.

So different were the DNA samples that in the researchers' opinion, they were effectively two separate breeds.

The strength of these results was substantially reinforced by a further study for Defra.

2.(Ref: FA0112. R.Ogden. 2012)

Additional verifying research was then carried out for Defra to confirm the practical robustness of the earlier studies, particularly for Traditional Herefords or more correctly "*Original Population of Hereford Breed*"

3. (Ref: FA0125. R.Ogden & Murray-Dickson. 2014)

Concurrently with this research, the Traditional Hereford Breeders Club (THBC) had also instituted and funded their own programme of DNA research utilising the services of a world leader in Bovine DNA genetic research.

4.(Ref: : J. Taylor, University of Missouri. 50k SNP comparisons. 2015)

The results of this research, which included not only North American samples and Original Population samples from the UK, but also samples from Australia and the USA where the herds involved had conducted only intra breeding selection from the stock originally imported from the UK in the nineteenth and early twentieth centuries. The substantial genetic differences identified in the Defra/FSA studies were even more starkly revealed in this research. It also categorically showed that those 'Original Population' samples from Australia and the USA had DNA profiles almost identical to those of the Original Population British samples and were distinct and distant from the North American stock from which imports into the UK had taken place and continued to take place and which clearly showed evidence of multiple unexplained genetic differences in the SNP profiles.

It also identified a very limited amount of either geographical or environmental genetic drift in those Original Populations from Australia and the USA, relative to those of the Original Population in the UK.

This latest research has not yet been published or presented to the Hereford Cattle Society.

More extensive DNA research continues and this is likely to show even more detailed information about the introgressions that have taken

place in the imported Hereford stock, all without any mandate or agreement from or clear knowledge of the members of the Society.

Is it of any importance that we now know that the numerically largest part of the Hereford breed in the UK is made up of imported hybrid cattle of unknown purity?.

Is it proper that the introgressions took place and maybe continue to take place, without the prior knowledge of, or any mandate or agreement from the members of the Hereford Cattle Society?. Further, even with the evidence now available to the Council of the Society, no public admission has been made about the truth of this matter to the existing members of the Society or to any new or prospective members. Of course, we now have the economically viable tool of DNA analysis to determine and assure the purity and parentage of the pedigree stock we breed.

It is of importance that The Hereford Cattle Society uses this tool, to the full as soon as possible.

The question remains, does any of this matter?. Does the revelation of past deceits and errors matter and should and how can they be remedied.?

I believe it does matter. It matters very much. And yes, they should and can be remedied.

First is the need for public acknowledgement and acceptance by the Council of the Hereford Cattle Society, of the true facts about the breed as it is today. Then the creation of a sensible and viable agreement about how to handle the current and future progress of the breed, including the protection and prosperity of the Original Population Hereford and its valuable genetic store.

Purity and Pedigree should be inseparably bound together.

No single person or group should be capable of the expedient or dishonourable manipulation, for personal or corporate gain of the genetics of the Original Population, without the full disclosure and agreement of ALL the Breed Society, and the full ongoing support and protection of those who do not wish to compromise the genetics of the Original Population.

The promise of purity should be the implicit guarantee of any pedigree certificate and should be capable of confirmation today by appropriate Genetic testing.

Research Notes 1,2,3,4: In brief, DNA analysis showed that 96 specified SNPs were used to identify and verify breed members of all breeds in the scheme. The breed average for UK breeds in the scheme was 14 SNPs of the 96.*

The North American Derived Herefords (NAD) required 22 SNPs and the Original Population Herefords (OP) required only 8 SNPs. Both groups, NADS & OPs had 5 SNPs in common.

**SNP –Single Nucleotide Polymorphism, identifies DNA sequence variations..*