

FROM PLAN TO PROGRAMME

Much has been discussed and reported about a Global Breeding Plan for the Guernsey breed. Now the first steps to making this a reality are being taken in the UK and Guernsey Island. WGCF Secretary Bill Luff and Consultant Dr. Maurice Bichard report.

The Background

Way back in 1992 Dr. Ted Burnside, the then head of CGIL, Guelph, highlighted the need for global co-operation involving all Guernsey breeders in order to secure a viable future for the breed. This view has subsequently been endorsed by many of the world's most eminent geneticists. The main points that they raised were:

No one country has sufficient Guernseys to mount a competitive breeding programme.

Guernsey breed associations must take the initiative to develop a programme themselves because no other organisation is likely to be willing to do this.

The real danger for the Guernsey is that those responsible for the future of the breed will not recognise the need to take action before it is too late.

Geneticists who have been involved with research work for the World Guernsey Cattle Federation made the following statement at the 10th. World Guernsey Conference last year in South Africa.

'We are unanimous in our view that the Guernsey Breed has a severe risk of losing its commercial relevance but also that it has opportunities provided that the following are addressed as matters of the very highest priority and urgency:

1. An increasing number of young bulls used for breeding to a MINIMUM OF 75% of females in all countries.
2. Increasing the number of recorded cows in all countries.

A particularly important and desired outcome of these two actions will be to have MORE COWS Sired BY YOUNG BULLS included in genetic evaluations.

A further important action would be to ensure an active involvement of grade cows in the Guernsey breed development programmes.'

This view was endorsed by the WGCF Guernsey Global Breeding Plan Sub-Committee in its statement that was printed in the 10th. World Conference issue of Guernsey World on page 47.

Although some members of WGCF felt unable to move ahead immediately with what is seen as a radical change in breeding philosophy, all members committed to trying to increase the use of young sires to breed herd replacements. The main reason for this is that it is only young sires that give us any NEW information by making use of current and future genetic variation to create improvement. Conversely heavy use of individual proven sires to produce second and further crops of daughters in a numerically small breed restricts the availability of resources to sample young sires and narrows the variation from which further improvement can be created.

It is interesting to note that every generation of young sires

consistently out performs the previous generation of proven bulls. This means that on average each crop of young sires can be used AS A GROUP with confidence. Just as with proven sires there will be some in any group that are much better than others so it is important to use the whole group and not just one or two that take your fancy, they might be the ones at the lower end!

The Future

So why can we not just continue the policy of the past 30 or 40 years? We all know that 30 years ago the world Guernsey population was very much larger than it is today and that then there were probably more than three times as many young sires entering AI annually as the current 30. As a consequence, the chances of finding several real improvers within the present number are slim. And if only one emerges it would be folly to use him very widely to breed more daughters and sons, since we would only create future inbreeding problems when his descendants started to appear on both sides of the pedigree.

The Options

What then are the options? One is to return to the methods we used during the 1960s and 1970s where many individual breeders follow their hunches, try to breed or buy bulls which they think will suit their own needs, and hope to build a reputation for their herds which will bring in good sales for bulls and surplus heifers. The probability is that the breed as a whole would stand still, as it did before, while the world's Holsteins and some other large breeds forge ahead at 2% per annum and as a result we lose any commercial credibility.

WGCF working with the UK and Island breed societies

The option promoted by the World Guernsey Cattle Federation and chosen by the English Guernsey Cattle Society and the Royal Guernsey Agricultural and Horticultural Society supported by the States of Guernsey Agricultural and Countryside Board is to recognise that progress can only be achieved by breeders working together within a single co-operative programme: the GGBP. The details have been worked out with a lot of help from breeding scientists and implementation is about to begin. It is hoped that this two-population programme will gradually spread to become a truly global affair. This will depend mainly upon overcoming the veterinary barriers to international semen movements. It is clear that many breeders recognise the need for a new direction and the hope must be that GGBP can become truly global before long.

Detailed Procedures

The methods to be used are extremely simple. They have been evolving over recent years when initially the UK and then Island committees found that there were insufficient proven bulls available. They started to use more locally-bred young bulls from good parents.

A two-year research grant from the UK's Milk Development Council and funds provided by WGCF have been used to investigate how to make this different approach more efficient.

WGCF has also obtained large scale funding from various international bodies to fund work on global evaluations for Guernsey bulls and cows and for the creation of a World Guernsey Database. In this we have been lucky to get the input not only of one of the world's most respected animal geneticists (Dr John Woolliams from the Roslin Institute, Edinburgh) but several others with different but relevant experience such as Dr. Jan Philipsson and Freddy Fikse of INTERBULL and Dr. Ted Burnside of CIAQ Canada.

All breeders are aware that the individual cattle in any one generation carry different sets of genes which they would transmit (as half samples) to the next generation. Their average contribution is their transmitting ability (PTA) or breeding value. Breeders naturally want to identify those individuals that will best move the population in a chosen direction and then prevent all others from leaving progeny.

The best cattle can only improve the population average when they are used to contribute more than their fair share to the next generation. In past years we have tried to identify the best females by noting the performance of their dams and grand-dams, plus their sire's progeny test until they produced their first lactation record. Similarly, a bull remained largely an unknown quantity until he had a reasonable number of daughters in milk. With our latest systems we are better off because the computer can store production and type data and provide a PTA (predicted transmitting ability). It can also combine PTAs for different traits according to the weight we decide to give them in our breeding goal and so provide a constantly updated index value: PIN, LPI, PTI, GMI.

It is obvious that as we accumulate more information on an individual, so our ability to predict its breeding value improves. We assess the usefulness or RELIABILITY of a predicted Transmitting Ability figure by its correlation with the true value. The true value can only be known for a bull which has several hundred recorded daughters out of random cows. The measured PTA would then be perfectly correlated with the true value, a RELIABILITY of 100%.

There are three factors that control the rate of improvement:

- The reliability with which we can recognise true breeding value (correlation or accuracy)
- The proportion of those evaluated which we choose and allow to produce the next generation (selection pressure)
- The time it takes us to make the selection decisions and hence their age when they leave progeny (generation interval).

It will be clear that these three are not independent:

Higher accuracy may mean waiting longer

Higher accuracy may mean selecting among fewer candidates.

Successful selection not only improves the population mean or average, it also creates inbreeding which reduces the genetic variation available to us on which to base future selection.

The geneticists who have planned GGBP have balanced the value to us of short-term gains against any loss of longer-term progress by modelling different solutions and calculating the predicted response from each.

The GGBP

With this background it is fairly simple to describe the GGBP.

Assumptions

| | | |
|---|-----------------|-------------|
| 1800 Island females: | 66% involvement | 1200 |
| 5000 UK females: | 50% involvement | <u>2500</u> |
| | | 3700 |
| (females used for older bulls & breeders' projects) | | <u>3100</u> |
| | Total females | 6800 |
| Assume 2 straws/conception | | 7400 straws |
| Assume 10 straws/recorded daughter | | 740 heifers |

Management

This is a joint UK and Island programme and the management committee will include representatives from the EGCS Future of the Breed Committee, the RGA&HS Herd Book Council and the States Agriculture and Countryside Board Breed Development Panel. The Field Manager is Digby Gribble, EGCS consultant, Dr. Maurice Bichard and Dr. Andrew Casebow act as advisors and the WGCF Secretary is the Liaison Officer.

An important point is that the decision making will be in the hands of herd owners subject to strict adherence to the programme and agreed procedures.

Procedures

All 3700 cows will be officially recorded. Production and type records will be entered onto a single database. PTAs for all traits and a Guernsey Merit Index will be updated quarterly by the UK Animal Data Centre.

The Guernsey Merit Index has been devised following a questionnaire that was sent to all breed committees by WGCF. This revealed that the type of cow that was required was one that would produce well, have a good health record and would not be involuntarily culled (she would have a long herd life). After detailed consideration of these points Dr. Woolliams calculated the Guernsey Merit Index. This places an emphasis of 60% on yield, 23% on udder score, 12% on feet and legs and 5% on SCC.

Up to 20 young bulls will be used to mate these cows. Some will be brought in from overseas but the majority will be produced in UK or Guernsey (approximately 8 and 4 in the initial stages).

The selection committee will consider recommendations based on the Guernsey Merit Index and other relevant factors quarterly, and select females to be bull dams. They will:

negotiate contract matings – say 50-100 per year :

10-20 no result

20-40 heifer calves

20-40 bull calves.

buy up to 30 bull calves, rear, but finally collect semen from up to 20 based upon revised GMIs of their sires and dams at 15 months (two years after the contract matings were planned).

Initially it is thought that we will have 8 UK young sires available this year and 4 from the Island. We will also import at least 2 young sires as part of GGBP and at least one proven sire that meets our selection criteria (GMI>300), but these are

becoming hard to find.

Bull dams

Bull dams should be as young as possible since in an improving population the youngest age group ought on average to be the best. The accuracy for the PTA does not increase sufficiently as the cow adds successful lactations to compensate for the delay in using her genes widely in the population via her son. We should initially aim to select bull dams at the beginning or end of their first lactations and contract mate them immediately or three months into their second lactations.

Bull sires

Because each young bull will not have a very large number of daughters (perhaps average 40) we shall never achieve very high accuracy in identifying true breeding values (maximum 75%), and we have to use 10 or more bull sires, so if we waited for the 20 young sires to get their progeny tests we would have to select half of them – and would not achieve much selection pressure.

We are thus better off using young bulls to sire sons as well as daughters. We can either use all the young bulls immediately (15 months old) for contract matings, or we can wait until their half-sisters have part lactations (around 2.5 years) and use stored semen from the best 10.

Requirements for Success

The success of the programme will depend in part upon the willing co-operation of herd owners, their agreement to commit a proportion of their cows to it, and to conform to a few rules.

They must agree to take semen from several of the programme bulls each year (Island, UK and overseas) and to record their heifer calves into a first lactation. Owners must however be free to arrange matings to suit themselves (without deliberately prejudicing any young bull). They must also be free to mate the remaining cows by following their fancies. They should nevertheless be willing to permit the programme to make specific contract matings with their best young cows and sell any bull calves to the programme (at birth, or in time for semen collection) at a price to cover their costs.

The final working details of all these procedures will be agreed with owners in the coming months – and can be modified with experience. All of us who are involved in an advisory capacity must remind ourselves that the owners of the cattle must be satisfied with the programme since it is their incomes

which are involved, and they operate also within the framework of their breed societies.

Breeding Goals

In order to be acceptable to the required proportions of herd owners there must obviously be broad acceptance on the type of Guernsey cow we need, and what traits we must emphasise. It is probably impossible to achieve perfect agreement. Herd owners will differ because of their own individual outlooks, but also because their production systems will differ – through choice or because of circumstances. Nevertheless, we can surely start with a statement of the common features of UK and Island farming systems based on grazing and conserved forage with supplementary concentrates). Second, we should agree on our required product: year round milk production at 4.8% fat and 3.5% protein with SCC below 100,000.

Matching these requirements with our assessment of the current quality of our cattle we can define our breeding goal as

1. Recognising the need to continue to improve yields
2. Restoring higher component percentages following a downward drift
3. Improving udders for health and management
4. Maintaining feet and legs and fertility.

The Guernsey Merit Index (GMI)

A collaboration between breeders and the scientific advisers has produced a Guernsey Merit Index which should achieve all these components. It has been checked out by the Animal Data Centre which has agreed to calculate it quarterly. It takes the PTAs for yield traits, udder score, feet and leg score and SCC and weights them all into a single index figure – the GMI.

$$\text{GMI} = ((\text{Milk} \times -0.4) + (\text{Fat} \times 9) + (\text{Protein} \times 20) + (\text{Feet and Leg Composite} \times 10.9) + (\text{Udder composite} \times 24.3) + (\text{Somatic Cell Score} \times -0.65))$$

Our prediction is that its use would

- Increase milk yield
- Increase fat % (and yield)
- Increase protein % (and yield)
- Improve udder score
- Improve cell count
- Improve lifespan
- Hold feet and leg score.

The first bulls have now entered the AI studs and we will soon be distributing the first straws of Guernsey Global Breeding Programme semen.