Submission to NZ Animal Evaluation Ltd on the Review of the National Breeding Objective 2020.

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On behalf of the Holstein Friesian NZ Board and members, this submission has been put together to outline our views on the upcoming National Breeding Objective review.

Holstein Friesian NZ's interest in the National Breeding Objective is as follows:
Holstein Friesian New Zealand (HFNZ) is a collection of member dairy farmers that have an interest in farming and breeding Holstein Friesian animals in New Zealand. Holstein Friesians make up 33% of the over 4.5 million dairy cows milked in New Zealand.[1]

The Objective Statement of Holstein Friesian NZ is:
"To progressively develop and support the breeding of genetically elite cattle, ensuring profitability of the Holstein Friesian breed. We are committed to developing and implementing services that record, improve, and promote the Holstein Friesian breed to the benefit of breeders and the dairy industry."

HFNZ is an organisation built around its membership of just under 800 farmers and breeders who belong to the various club and branches of HFNZ, throughout the country. To achieve the objective statement, HFNZ provides several services. The services offered include the registration of Holstein Friesian pedigree stock via the national database and the opportunity to grade up to pedigree status via 'Record Recovery' and the 'Supplementary Register'. Classification and TOP (Traits Other than Production) inspections are important on-going services to the farmers, as is the active promotion of pedigree stock through joint young sire schemes and semen sales (with CRV), AI centres, advertising, Discovery Project (with LIC) and shows.

Publication of herd and cow statistics, technical information, breeder profiles, competitions, along with breed and industry news appears in regular newsletters, and the *nzholstein* magazine. Members are also kept up to date with news and industry updates via our website and social media platforms.

Holstein Friesian New Zealand is a member of the World Holstein Friesian Federation and actively contributes to the sharing of information at a global level.

As custodians of the Holstein Friesian breed in New Zealand, HFNZ uses the National Breeding Objective in its day-to-day business operation. Many our member farmers also use the National Breeding Objective in the day-to-day operation of their farming businesses. This submission has been written on behalf of all breeders of Holstein Friesian cattle in New Zealand.

[1] New Zealand Dairy Statistics 2018-19, LIC & Dairy NZ

Overview:

Holstein Friesian NZ welcomes a review of the National Breeding Objective (NBO) and asks that the review takes place based on accurate data. This review will impact selection/breeding decisions for the coming 15-20 years, and due consideration must be given to getting the basics right before any work is put into adding additional or niche traits.

Within the current NBO there are several traits that require further research to ensure that they are as accurate as possible and fit for purpose. One example of this would be liveweight, which has a large influence in the current system. Liveweight is a nonlinear trait and should be treated as such in New Zealand's index system. Currently, the basis for the liveweight trait does not accurately reflect the costs that could be associated with the trait.

A comprehensive review should be undertaken of this trait to look at what should and shouldn't be included, how the costs should be calculated, the environmental impacts, including the effects of a higher stocking rate (high numbers of cows per hectare won't be sustainable in the future) and the collection of accurate mature liveweight data. Calf data should also be included in this trait and must be calculated at an average across all breeds and regions throughout the country. Consideration should also be given to the value of calves sold, bobby calf prices, dairy beef, and seasonal influences.

As part of a liveweight review, consideration should also be given to the liveweight value allocated to overseas genetics when they first enter NZ. It is no longer appropriate that all overseas genetics receive the same liveweight value until they gain a NZ daughter proof. With the introduction of genomics, the gene pool in NZ is decreasing and the use of overseas genetics is required to ensure there is outcross potential in NZ breeding and that the rate of inbreeding does not increase rapidly, as has been seen in other dairying nations around the world.

NZ should have a strong, well-researched national index first, and foremost. The industry must be careful not to add too many traits to the index and water down the important traits (production traits). Keep it simple and offer breeding values on additional or niche traits that NZ farmers can use to personalize the information they require to suit their own breeding objectives/goals. Traits available for farmers to use alongside the national index could be – polled, A2A2, high input index, once-a-day, facial eczema resistance etc.

Predicting Future Trends:

NZ farmers require an index that is stable and calculated from concise accurate data following robust research. Fluctuations in the national index are one of the biggest deterrents to farmers regardless of breed, farming system or belief. Seeing results and improvements in genetic gain in their herd is what farmers strive for daily. An index that is constantly changing does not build confidence.

Across the NZ dairy industry BW (Breeding Worth) is the measure used by banks, livestock agents and farmer owners to assess the value of investment, employment conditions etc. To keep the playing field even the index must be stable, reliable, and reflective of the true nature of the industry in NZ.

With more farmers moving away from supplying Fonterra, the industry should also be looking at VCR's (Value Component Ratio) from across the milk processors for the purposes of the national

index. Since the last NBO review in 2012, the NZ milk supply chain has seen several processors become more prominent in the market and it is no longer appropriate for Fonterra to be considered the only milk processor.

Breeding decisions are made three years before animals are producing and the farmer is getting paid for the end product. This lag suggests that a fairer way to value milk would be based on an even fat to protein ratio (1:1), and a milk price averaged over 10 years, would appear to be a more consistent predictor, which would eliminate the highs and lows.

Farmers, regardless of breed, should be consistently trying to improve the fat and protein components in their herd and this should be reflected consistently in the NBO.

Fertility:

Fertility is an important component of the current national index; however, it is another area that currently suffers from a lack of accurate, robust data and is currently a poor predictor of fertility across the national herd.

Recording of reasons for culling within the national herd are not always easy or accurately recorded. Before the weighting for fertility can increase in BW, the industry needs to ensure that the current fertility calculation is based on the best data possible and considers all factors regardless of breed.

A high fertility index could be introduced and available to farmers alongside a stable, accurate base index. Farmers should have access to economic breeding values to use with such indexes and be able to tailor the data to their own needs, aligning with their individual business operations.

Looking to Australia around the collection of more accurate data in the pursuit of improving their national index, they have implemented Ginfo. Ginfo is Australia's national reference population for genetic information. It includes detailed information on more than 30,000 dairy cows including genotypes, classification scores and performance data from herd recording. Ginfo has improved the reliability of Australian Breeding Values (ABV) and enabled research/development of existing and new ABV's, in particular the Daughter Fertility ABV.

The recent collaboration between DairyNZ, LIC and MPI, to launch the Resilient Dairy project is a move in the right direction. This programme should be used to develop herds where accurate data can be collected to provide research on existing traits and improve the accuracy of New Zealand's currently breeding values. Holstein Friesian NZ supports the Resilient Dairy project and is interested in providing support in any way that is required i.e. collection of traits other than production data.

Udder Overall:

While under overall is currently included in the National Breeding Objective as part of Residual Survival, the weighting currently does not fairly represent the importance this trait plays in everyday farming practices. With the drive towards making dairy farming more environmentally friendly and sustainable in future, udder overall is set to become even more important.

Udder Overall is highly correlated to longevity, however, longevity takes many years to achieve accurate reliability. Whereas the Udder Overall economic breeding value, derived from in-milk heifer TOP scores, is reliable just months into an animal's first lactation.

Around the world udder overall is considered a trait of the upmost importance and this is reflected in the indices of many countries. In New Zealand herds, udder overall is considered the second most important trait, after fertility. Farmers want animals capable of producing to their full potential (1kg of milksolids per 1kg liveweight) with an udder that is high, wide, and well supported by a strong ligament. The udder must last the lifetime of the animal and should reduce the high cost of replacement animals, for animals that are culled prematurely due to poor udder conformation.

Poor conformation udders or udders that do not last, equal lost milk production for the farmer, meaning that animals are culled early and without the ability to provide the farmer with a return on investment i.e. rearing, genetics feeding etc.

Farmers of all breeds have consistently been asking for New Zealand to follow the lead of many other countries around the world and increase the value of udder overall in BW. In recent years New Zealand has fallen further behind the rest of the world in genetic gain and the lack of importance placed on udder overall as a trait in our national index, has played a part in this.

If additional traits like Once-A-Day or High Output Systems are to be introduced in future, these will need more emphasis on udder conformation. The importance of Udder Overall in BW must be increased, regardless of breed for the benefit of the whole industry.

Environmental Traits:

While environmental issues are becoming more relevant in New Zealand currently and will impact the future of the industry, there are also many variables that could affect these traits, such as:

Genomic data
Farm management
Location of the farm (region)

NZ dairy farmers are striving to breed efficient cows, that minimize waste and would be prepared to give up profitability in order to make advances in environmental traits, only if they could be assured that they would in fact achieve advances. However, this will require the basic traits in the current index being correct. There are currently traits in the index that require improvement, and these should be addressed first. Revision and enhancement of existing traits should be the first step towards improving environmental outcomes for NZ dairy farmers.

The introduction of one stable genomic platform, from one reference population in NZ will provide additional data that will benefit the environmental issues facing the industry. Data derived from genomic testing must be accurate and relevant to the NZ system to ensure that it provides refined information and allows for informed decisions to be made.

Research has shown that:

- Dairy cows with low milk urea N breeding values excrete less urinary urea N.
- Dairy cows with low milk urea N breeding values produce milk with higher protein percentages.
- Environmental and productive benefits of cows with low milk urea N breeding values are consistent between season and diet.

- Selecting cows with low milk urea N breeding values presents animals as a solution for environmental concerns. [2]

However, environmental traits must improve genetic correlations and not comprise breeding worth regardless of breed influences.

Some level of validation must also be introduced to ensure that any new traits introduced by the breeding companies, pass a commonsense test, and are derived from accurate data.

As an example, LIC recently introduced a HoofPrint Index™. This index has been developed to provide farmers with an accurate insight into bulls born since 1 January 2009, that have the potential to breed progeny for dairy herds with a lighter environmental footprint i.e. cows that produce less methane and nitrogen per kilogram of milksolids.

Further investigation of this index found that it was heavily correlated to liveweight, includes fertility twice and is based on a number of assumptions i.e. that dairy cows only consume pasture to satisfy their energy requirements and that most NZ dairy farms operate on System 1. It also infers that the lighter and smaller the animals, the less environmental footprint, however, nowhere did it mention that if you have lighter/smaller animals you will need more of them to achieve production targets and the impact of more animals on the environment.

While environmental traits could provide great benefit to NZ dairy farmers they must be based on science and not assumptions. NZAEL must have a mechanism to regulate such traits introduced by breeding companies to ensure the marketing does not get ahead of the science, for the benefit of the industry.

High Output Systems:

While a High Output Index might appeal to many NZ dairy farmers, it is low on the priority list compared with getting the national index correct in the first instance. If a High Output Index were to be developed, some of the assumptions listed in the consultation document seem incorrect and HFNZ would not support an index based on such assumptions:

- Cows doing ~400kgMS are not really "high output" - this must surely be based on the national average in years to come?
- Higher feed costs are an extremely debatable factor. Grass alone is not cheap and DairyNZ quotes values of grazed pasture to be around $300/tDM, which is very similar to maize and PKE used to support higher output herds.
- Liveweight should not be further penalised due to feed costs (as above), and due to the opportunity for good higher liveweight cows to consume more than is required for maintenance and in turn produce more, rather than increasing the stocking rate i.e. 1kg of milksolids per 1kg of liveweight.
- The weighting for fertility should be like BW, just because higher output herds may utilise tools such as extended lactations or split calving, this does not mean that is their goal is an ideal world. Some resort to it purely because they are exposed to the inverse relationship of milk production to fertility. Most farmers would love to have low empty rates (wastage) and be able to have a compact seasonal calving.

[2] https://www.sciencedirect.com/science/article/abs/pii/S0048969720335142

- Udders would be of vital importance in a High Output Index.
- Overseas high output indexes may give some indication, but still would not capture the performance on NZ farms and conditions.

Heterogeneous Variance and Optimal Sire Selection:

While having one national index that is stable and provides accurate data to farmers, this will never be a system that fits all. Alongside the national index breeding values should be available for a range of traits to allow the farmer to customise what suits their breeding goals, farming systems or employment objectives.

NZAEL should be looking to develop such tools to optimise the rate of genetic gain in NZ herds.

Artificial breeding companies that develop their own indexes or sub-indexes to help guide the selection of AI sires to meet farmers' needs, should be required to prove the science behind each index. NZAEL should set and monitor a standard for the development/introduction of breeding company specific indexes to ensure that NZ farmers are receiving accurate and factual information, not based on assumptions. A good example of this is the HoofPrint™ index referenced earlier in this submission.

Other Traits:

In a perfect world there would be no limit to the number of additional breeding values or indexes available for the farmer to utilise as they see fit. However, reality is that there is considerable investment required to ensure that each breeding value and/or index is accurate and compiled from reliable sources of data.

With NZ falling behind the rest of the world in recent years, Holstein Friesian NZ believes that the best course of action is to ensure that we have the basics right on a single platform that includes genomic data. Once we have the basics right then time and resource can be put into accurately developing additional or niche traits for farmers to add to their toolbox and make breeding decisions from.

Frequency of Updates:

With research showing that updating BW every five years versus annually, over a 20-year period, had the same basic effect. Holstein Friesian NZ believes that moving to an update every three to five years would be best for NZ.

If the basic traits within BW are calculated from accurate, reliable data creating a more stable index system, this would increase farmer confidence and improve the value of BW. Fluctuations and changes from annual updates have seen breeders lose faith in the current system and in many instances move away from the use of BW.

Building farmer confidence in the national index should be a priority goal for NZAEL/DairyNZ.

Conclusion:

Holstein Friesian NZ appreciates the opportunity to contribute to the review of the National Breeding Objective. Our national index should be a fair and equitable tool for all NZ farmers to use, regardless of breed, farming system, geographical location, or breeding philosophy. It should be

researched, developed, and owned by an industry good body and free from any commercial influences.
Good progress has been made in the right direction in recent times and this must continue to ensure the NZ dairy industry catch up to the rest of the world.