Shetland Cattle: Breed Analysis Report; January 2021

Lawrence Alderson
ecnewal@gmail.com

I have been writing an annual report for Shetland cattle for almost two decades. I cannot remember exactly why it started but I suspect it resulted from my presentation at the millennium conference in Shetland which gave the cattle a higher profile on the livestock stage. When I look back through previous reports several issues stand prominent. On one hand there have been dire warnings of the danger of genetic bottlenecks threatening the breed and economic crises that affected all breeds, but above all I could not fail to note frequent references to the success of owners of Shetland cattle in maintaining diversity in the breed. For those of us tutored to believe that uniformity (i.e. strict adherence to a breed standard) is the primary goal of animal breeders, it requires a conscious effort to 'convert' the mindset to an understanding that genetic diversity is key to sustainability. Therefore, it might seem contradictory to some readers to discuss diversity and breed type in the same sentence, but the former underpins genetic health and the latter ensures continuing adaptation to the environment in which the breed evolved. Some variation in breed type was evident when I judged at the centenary Show in Cunningsburgh in 2010, but all the animals were adapted to the climate and geography of the Islands. Breeders and owners have good reason to be proud of their breed and themselves. Despite the economic downturn of 2007/08, the uncertainty of Brexit a decade later, and the current Covid-19 pandemic with climate change lurking in the background, positivity has proved a strong asset for the breed.

As usual this report is not a solo effort. I have relied on others for essential information and I am grateful for the comprehensive help given, especially by Peter Hardman, Maggy George and Albin Smith. Much of the report deals with historical issues and the lessons that can be learnt to assist ongoing policy and programmes, but also includes a section on Future Policy and bulls born in 2018 onwards or potential bulls that may be born in 2021.

Summary of main items

Positive:

- The genetic health of the overall breed has improved as evidenced by an improving balance between lines to improve genetic diversity, and the judicious use of good bulls to improve quality.
- The population on the Islands seems to have stabilised, albeit at a relatively low level.
- There has been no further loss of bloodlines and GCI (founder effect) has remained fairly steady.
- Bulls available through AI offer a wide range of lines, although Heather still is too dominant.

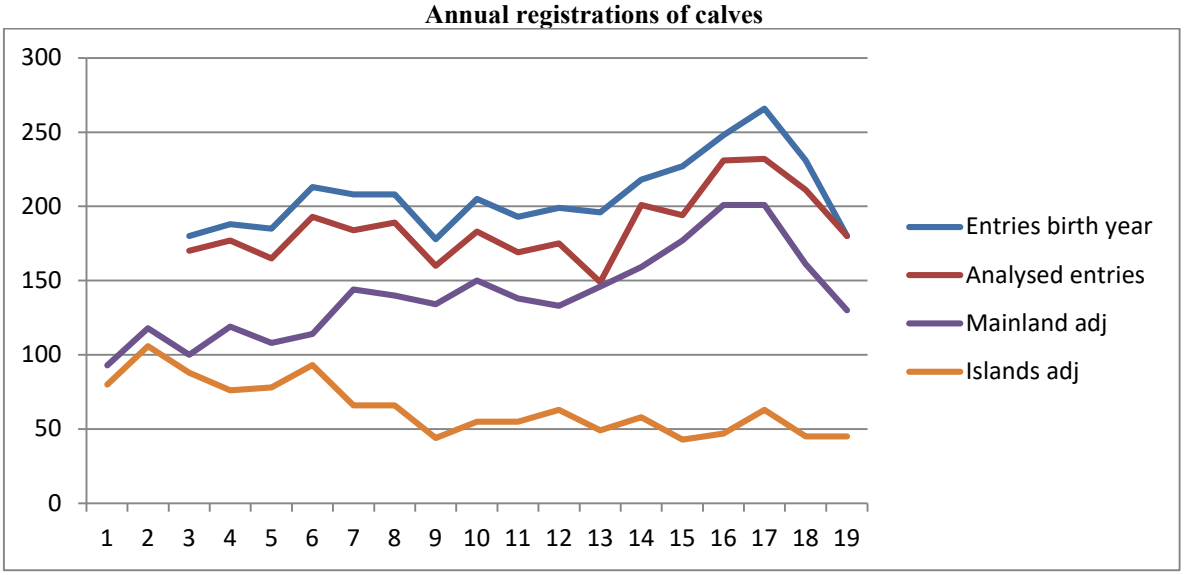
Negative:

- Breed numbers outside the Islands have declined.
- The Knocknagael Mary family remains in danger of extinction, and some other lines and families make a negligible contribution.
- The influence of bull lines remains unbalanced on the Islands with continuing heavy dominance of Heather genetics.
- Factors outside our control; economic downturn, uncertainty surrounding Brexit, climate change and Covid-19.

Population trends

The 2018 herd book noted a possible turning point in the relative fortunes of the breed on the Islands and the Mainland. After late registrations have been allocated to the year of birth (Figure 1) and annual figures revised accordingly, the final picture for 2019 confirms the trend of declining numbers seen in 2018-born calves on the Mainland. The decline this year has been steeper. Possibly there are unregistered animals that will augment the 2019 figure (and maybe the 2018 figure) if subsequently registered, but the decline seems more likely to be an outcome of political and financial uncertainty in recent years. In contrast, the Islands have further confirmed the stabilisation seen in the previous decade, but the overall breed's numerical status now is similar to a dozen years ago. On the basis of the formula of four breeding cows per female calf registered, the breeding herd now numbers about 850 cows and may lead to revised classification of the breed by RBST.

Figure 1
Annual registrations of calves



Genetic analyses

Breeders of breeds with a small population cannot afford to focus attention exclusively on selection for performance. They must also consider genetic diversity to maintain variation necessary for ongoing health and viability. Even globally popular breeds are not immune to the problem. Holstein cattle in USA enjoy the benefits of a huge population but they also have allowed inbreeding to rise and founder effect (GCI) to deteriorate. There are only two surviving sire lines, and one of those carries a lethal abortion gene. They provide a powerful lesson in the importance of maintaining genetic diversity. However, the quality of breeding animals should not be neglected. It may be judged in different ways from the intuition of the experienced eye of the breeder to the evaluation of the quality of a sire's progeny and many Shetland bulls have proved their value.

When I visited the bull stud at Knocknagael in the 1970s I recorded with my notebook and camera the variation between the larger rougher type of Glebe Rasmie and the smoother-fleshed style of Knocknagael Jarl. They were a clear illustration of the genetic variability found in Shetland cattle at that time. Subsequently the population experienced threats to its genetic diversity and my annual reports have highlighted dangers of dominant lines (Heather) and genetic bottlenecks (Collafirth Rasmie and Templeson Boris). They have been a cause of

concern but never ran out of control. The latter now is largely only of historic interest, while the former is being contained for the time being. They are described more fully below. The other ever-present threat is the loss of founder lines, which is reflected by the calculation of GCI, and such a loss has not been experienced by the breed since these reports began although some families (e.g. Knocknagael Mary) have been on the brink of extinction for many years.

GCI

The founder effect has been remarkably steady in the last decade, especially in the context of a numerically small breed. There is no evidence of impending threats to disturb its stability, apart from the possibility of a continuing decline in the population size which the fall of the number of active ancestors in 2019 may predict (Table 1).

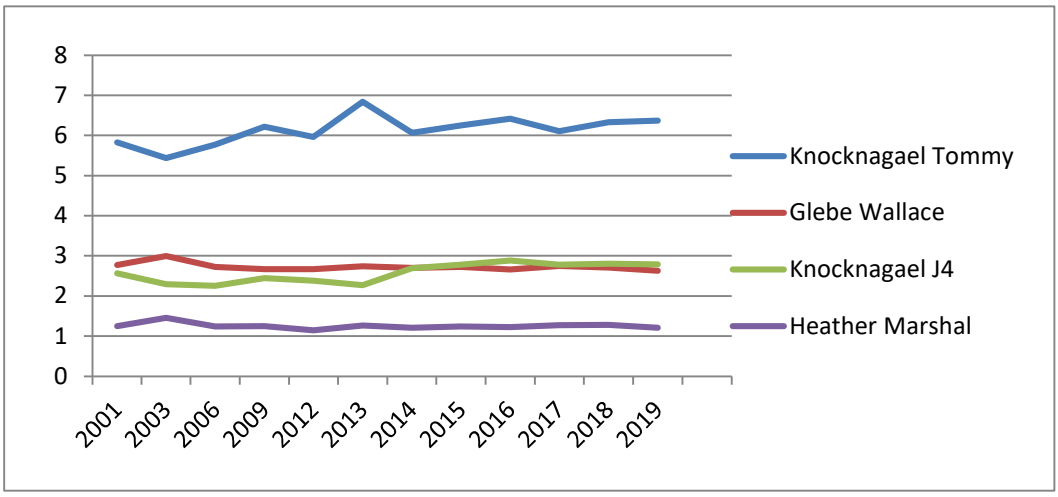
Table 1
Loss of Founders 1981-2018

Measure	1981	1999	2002-5	2006-9	2012-5	2016	2017	2018	2019
Active ancestors		798	909	1056	1386	1550	1567	1569	1514
Active male founders*	28	25	25	25	25	24	24	24	24
Active female founders*	66	53	47	48	48	48	49	49	49
Total active founders*	94	78	72	73	73	72	73	73	73
GCI			32.63	31.59	31.57	30.67	31.21	30.96	30.73

*figures may vary slightly from earlier versions as a result of recent update

Bull line founders and HB Volume One representatives

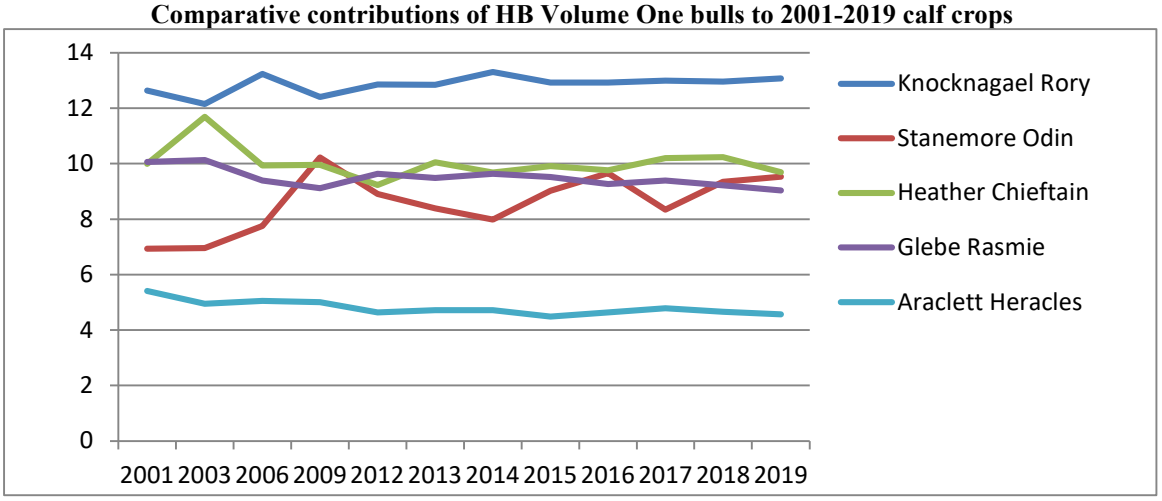
Figure 2
Contributions (%) of founder sire line bulls to calf crops 2001-2019



Knocknagael Tommy continues to make the largest male founder contribution (Fig 2), but the relative contribution of the founder of each sire line remains constant. Some founder cows (e.g. Knocknagael A1, Knocknagael C1, Glebe Hebe and Setter Blackie) make contributions almost equal to Tommy.

There was some fluctuation initially in the pattern of influence of the main representative of each of the four sire lines which were registered in Vol One (1981) of the Herd Book (Fig 3), but it has remained steady for the last ten years when calculated for the whole population, although there are regional variations.

Figure 3
Comparative contributions of HB Volume One bulls to 2001-2019 calf crops



Note: The contributions shown in Figures 2 and 3 are for comparative purposes only between animals in each Figure. They cannot be compared with the % figures in other Tables.

Rasmie and Boris

The average contributions in 2019-born calves of Collafirth Rasmie and Templeson Boris, which historically posed a genetic bottleneck threat, indicate they have settled into a much steadier level (Table 2) although some individual animals carry dangerously high levels as noted in the bull lists (Tables 3 and 4).

Table 2
Changing influence of Collafirth Rasmie and Templeson Boris 2012-2019

Bull	Location	2012	2013	2014	2015	2016	2017	2018	2019	%+/-
Collafirth Rasmie	Islands	8.13	7.83	6.96	5.09	6.57	7.33	6.22	6.22	- 23.5
Collafirth Rasmie	Mainland	2.93	2.83	2.79	3.28	3.17	3.08	3.18	3.26	+ 11.3
Templeson Boris	Islands	8.28	8.76	6.56	5.39	5.24	7.05	4.20	4.20	- 49.3
Templeson Boris	Mainland	3.39	2.90	2.97	3.27	3.20	3.24	2.95	2.72	- 19.8

Influence of young bulls on 2019 crop of calves

Mainland

The increasing dominance of Heather genetics has been noted in previous reports, and the increasingly urgent recommendation to curb that trend seems to have been recognised and acknowledged to some degree (Table 3). Only one of the most influential young bulls used in 2018 carries a high Heather level, but two others (one of which is an AI bull) carry a high level of Collafirth Rasmie. On the other hand four of the bulls are sons of recommended sires (Balou, Innes, Adonis and Rufus) which indicates an encouraging change of emphasis in the selection of herd sires.

Table 3
Contribution of young bulls to 2019 crop of calves on the Mainland
(Bulls marked * now believed dead) (2018 figure in brackets)

Bull	Born	Contribution	Notes
Bearford Darroch*	2016	2.31 (0.93)	
Renwick Renoir (AI)	2016	2.12 (1.24)	High level of Collafirth Rasmie
Carn Bhren Inuus	2014	1.92 (0.93)	Son of St Trinians Balou
Broadacres Bruce	2014	1.54 (0.47)	Son of Gillarunna Innes
Carn Bhren Liam	2017	1.54 (nil)	High level of Collafirth Rasmie
Greenoak Neo	2014	1.54 (nil)	High level of Heather
Rogiavi Hamelin	2017	1.54 (nil)	Son of Garths Adonis (old line)
St Tudwals Arwel	2016	1.54 (0.31)	
Whinpot Red Adair	2016	1.54 (0.93)	Son of Blazefield Rufus
St Trinians Hero*	2017	1.54 (nil)	
Wharncliffe Kirk*	2016	1.54 (1.24)	

Islands

In the report last year it was noted that Collafirth Odin seemed to be the only bull among the top 11 young influential bulls used in 2018 on the Islands that did not accentuate the Heather genetics imbalance. The analysis this year is almost an exact replica of that situation (Table 4). All the other bulls bring a heavy Heather concentration together with significant elements of Templeson Boris and Collafirth Rasmie. Therefore, Odin continues to carry responsibility to remedy the imbalance. He is from the Araclett sire line and son of an outstanding sire.

Table 4
Contribution of young bulls to 2019 crop of calves on the Islands
(Bulls marked * now believed dead) (2018 figure in brackets)

Bull	Born	Contribution	Notes
Collafirth Guinness*	2015	15.12 (4.44)	High Heather influence
Ocraquoy Haldor (AI)	2014	6.98 (3.89)	Concentrated Heather and Templeson Boris influence
Collafirth Odin	2016	6.98 (10.00)	Son of Balou
Gillarunna Robbie	2014	5.81 (5.56)	High Heather influence
Collafirth Bagheera	2016	5.81 (2.22)	High Heather influence; son of Balou
Ocraquoy Imperio*	2016	2.33 (3.33)	High Heather, Collafirth Rasmie and Templeson Boris
Collafirth Hamish	2017	2.33 (nil)	High Heather influence
The Point Jacobite	2015	1.74 (2.22)	Concentrated Heather and Collafirth Rasmie influence

Please note again: these contributions are for comparative purposes only between the animals in Tables 3 and 4. They cannot be compared with the results in Figures 2 and 3.

Future Policy

Earlier sections of the report have described the historical situation beginning with founders of the bull lines and the role of their direct descendants which represent each line in the Herd Book. They also have commented on subsequent bottlenecks (Collafirth Rasmie/Templeson Boris) and dominance events (Heather line), and evaluated the leading sires of the 2019 crop of calves. They all provide helpful lessons, but the immediate value of the report is to direct attention to young bulls which may become future herd sires in order to give breeders a guide to selection of desirable animals.

Listed below are bulls (mainly born in 2018, 2019 and 2020) which possess credentials that may prove beneficial in a herd sire provided they have not been castrated already.

Recommended bulls

England, and Wales:

I have accumulated a lengthy list of bulls used in England and Wales since 2017, plus young bulls not yet in service including calves born in 2020. The improving balance noted in the young sires of the 2019 crop is continuing with calves born in 2018-2020 as the bulls listed below demonstrate. The danger of the trend towards dominant Heather influence, reported last year, has been diluted but should continue to be monitored.

Recommended young bulls:

Rowland Montrose (2020), by Broadacres Bruce, Heather sire line; good balance of lines; minimal level of Collafirth Rasmie and Templeson Boris.

Gurnardwight Albert (2020), by Little Wyld Davidson (see below), Knocknagael sire line; good balance with modest Heather influence and low Rasmie/Boris.

Newsham Raven and **Newsham Robin** (2019), by Whinpot Jackdaw (son of Blazefield Rufus), Knocknagael sire line; strengthen Knocknagael influence; low level Rasmie and Boris.

Manod Llewelyn (2019), by Wild Meadows Charles (see below), Knocknagael sire line; strong Knocknagael influence with good level of Glebe; negligible Rasmie and Boris.

Little Wyld Davey and **Little Wyld Davidson** (2019), by Stanemore Odin, Knocknagael sire line; Davey's dam had good longevity; a great opportunity to access early genetics; low levels of Heather, Rasmie and Boris.
Hartons Mike (2018), red-and-white by Tinkers Hill Gentleman, Knocknagael sire line; dam had good longevity; strong Knocknagael influence with good Glebe; Heather level low; Boris level rather high.

Older bulls worth close attention include:
Wild Meadows Charles (2016) interesting and valuable bull; carries red factor; his carefully planned breeding is Welland Down both sides; several lines trace back to J4 (Knocknagael); Heather, Boris and Rasmie all have only a minimal influence.
Lincwold Sonny (2016), although he is from the Glebe sire line, he is strong on Knocknagael and Araclett influence; dam had good longevity.
Balnas Archie (2016), out of a Whinpot cow, he brings in valuable older genetics while keeping Heather, Boris and Rasmie influence to a very low level; may be dead.
Sinclair Bay David (2016) Heather sire line (grandson of Gillarunna Innes) but Heather influence is low and his pedigree is almost free of Boris and Rasmie.
Whinpot Red Adair (2016), red bull by Blazefield Rufus out of a Whinpot cow.
Wharncliffe Jack (2013), red-and-white by Blazefield Rufus, Knocknagael sire line; has a good balance of lines with relatively low Heather influence; low levels of Boris and Rasmie.
Broadacres Bruce (2013), by Gillarunna Innes (Heather sire line), but Knocknagael and Glebe are the strongest elements in his pedigree; sire of Rowland Montrose (see above).

Scotland:
Although the balance between the four lines in Scotland has improved, both Heather and Glebe still remain rather too dominant, and therefore Araclett and Knocknagael line bulls should have priority.

Recommended young bulls:
Stackyard Erik (2020), son of St Trinians Mansie, Knocknagael sire line; strong Knocknagael influence and low level of Heather.
Croic Bhein Hobbes (2019), brindle by Carn Bhren Inuus (see below), Araclett sire line; good balance of lines with low Rasmie and Boris.
Camuscross Marsaili (2019), by Stenscholl Paddy (see below), Knocknagael sire line; good balance of lines with minimal Rasmie and Boris.
Fleecefaulds Hagar (2019), brindle by St Trinians Balou, Araclett sire line; good balance of lines; Rasmie rather high, but Boris absent.

Older bulls include:
Rogiavi Hamelin (2017) brings some older lines into his pedigree; he is by Garths Adonis, one of the early AI bulls, and therefore belongs to the Araclett line; Rasmie and Boris are absent from his pedigree, and he has very little Heather genetics; inbreeding above average (17.5%).
Stenscholl Paddy (2016), red-and-white by Carn Bhren Irish (Knocknagael sire line) out of linebred Broadacres Zoe, is a worthy son of Irish; he reduces Heather influence and has negligible levels of Rasmie and Boris; he deserves to join a herd of quality cows to breed good sons.
Carn Bhren Inuus (2014) has been recommended previously in these reports but has been used only lightly; brown-brindle son of Balou, out of a daughter of St Trinians Mansie, an impressive pedigree, from which Rasmie and Boris are almost absent; currently working in England.

One or two good bulls are no longer with us:
Trondra Arrow (2009), son of Collafirth Laxness, Knocknagael sire line; excellent type and temperament but left mainly daughters; he still is available through AI.
Carn Bhren Irish (2014), r&w grandson of Collafirth Laxness, out of a daughter of St Trinians Balou; sire of Stenscholl Paddy (see above)

Islands:
Bulls used recently have concentrated Heather influence, and also increased Glebe influence, with the attendant danger of another genetic bottleneck. There is a dearth of bulls from the Araclett and Knocknagael sire lines and they remain a high priority.

Recommended young bulls are:
Hjem Holyfield (2020), by Collafirth Tyson (Tyson had very high recommendation in previous reports); although he is from the Heather sire line the level of Heather is low; Rasmie also is low and Boris is absent.
Collafirth Odin (2016), red brindle by St Trinians Balou, Araclett sire line; he is pre-2018 but still available (see Table 4) and worthy of careful note; he has a good balance of lines and reduces Heather influence; he has worked in the Geldron and Rockytoon herds.

Older bulls that merit attention include:
Gillarunna Thor (2016), son of Gillarunna Nocturne, Glebe sire line, but Knocknagael and Heather influence more evident;
Collafirth Tyson (2013), son of Lyndthorpe Raymond, Heather sire line; dam (Collafirth Emma) had good longevity and was 11 years old when Tyson was born; worked mainly in the Littlester herd, but also sired two bulls in Hjem herd; has high merit which was described fully in the previous report.

Australia
The Zetralia herd, which previously has been bedevilled by a run of bull calves, produced a bigger crop in 2019. The breeding policy is designed to achieve a good balance between the different lines with a wide representation of founder genetics. The influence of Templeson Boris and Collafirth Rasmie has been controlled, but Heather genetics still are rather too dominant.

AI bulls
Evaluation of the team of AI bulls appeared in the two previous newsletters and the situation has not changed.
The combined Heather/Glebe influence in the pedigrees of AI bulls is almost twice as high as that of the combined Araclett/Knocknagael lines. A few of the bulls have the potential to improve the balance between lines and use of the following should be prioritised to correct the imbalance:
St Trinians Balou (SCHBS**), St Trinians Mansie** (RBST), **Stanemore Odin** (RBST) and **Trondra Arrow** (SCHBS) should be high on the agenda.

On the other hand, a larger number of bulls such as Hengae Fearsome, Randolph Fergus, Boquhapple Kelvingrove, Ocraquoy Haldor, North House Frosty and North House Victor will exacerbate the problem of Heather dominance. Additionally it should be noted that five of the bulls have a heavy input (13- 23%) from Collafirth Rasmie and Templeson Boris. Therefore North House Frosty, North House Victor, Ocraquoy Haldor, Renwick Renoir should be used only after careful consideration of their impact on this problem. Renoir in particular owes 17.6% of his ancestry to Collafirth Rasmie.

Summary

The welcome signs noted last year that the population on the Islands has stabilized have been confirmed this year but the population elsewhere has declined. The significant increase in the number of registered animals, which was evident from 2009 to 2018, faltered at that point and now has been reversed. It has begun to resemble a trend rather than a blip.
On the other hand the breed appears in general to have surmounted the summit of the Boris/Rasmie bottleneck, although not on the Islands, and founder lines and families continue to be preserved with no losses for some time. In comparison with other rare native breeds the Shetland can show positive measures of diversity.
The ongoing concern is the dominant influence of Heather genetics which persists at a serious level in the Islands where there is a scarcity of bulls to correct the imbalance, but it is being brought under control elsewhere.
Nevertheless there is room for optimism. If breeders seek with diligence there is a reasonable choice of bulls which can maintain a good balance of lines within the breed. Past experience suggests that breeders have the ability and the will to select carefully and breed effectively to take the breed into the future with the good quality bulls available.