Shetland Cattle: Breed Analysis Report; December 2018

Lawrence Alderson
ecnewal@gmail.com

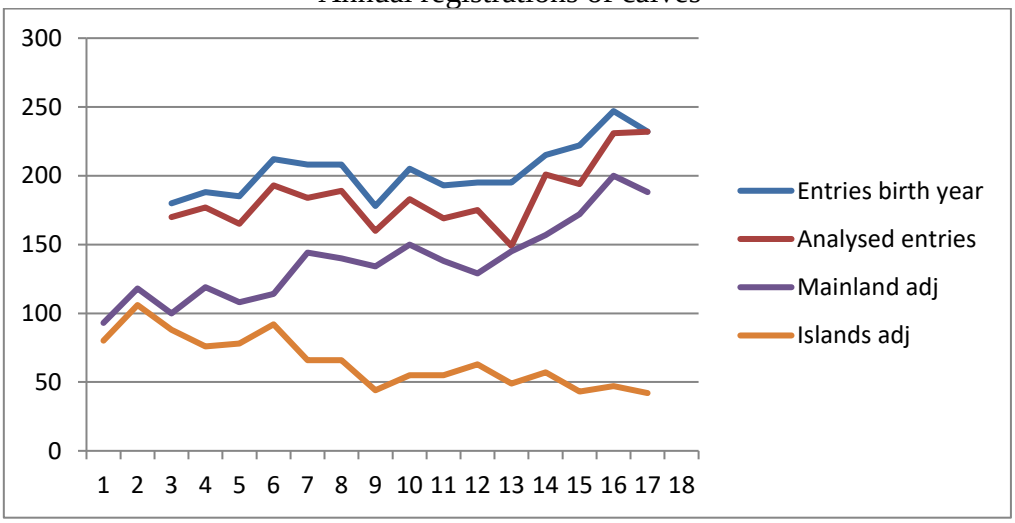
Shortly after the report was published last year I received feedback from some members, and I am most grateful to them. Feedback from members is valuable as it adds immeasurably to the accuracy of information for use in future reports. However, the feedback also alerted me to the possibility (even probability) that some members may not have seen the report. Of course it is not compulsory reading, but maybe it would be helpful for members who do read the report to encourage others to do so, both on the UK mainland and on the Islands. At the same time I will attempt to ensure the content is as relevant and useful as possible.

The report continues to be a team effort and I'm grateful to all members who have provided information but especially to Peter Hardman, Paddy Zakaria in the northern areas, and Barry Allen and Steph Ede in England and Wales. I have followed again the format of previous years as this facilitates useful comparisons and highlights important trends. The first section deals with historical population trends, genetic analyses and analysis of the 2017 calf crop. The second section deals with bull selection to maximise breed improvement and within-breed diversity.

Population trends

The allocation of late registrations to the year of birth has been applied again. The majority of late registrations were noted in Mainland herds (219) compared with only 73 in Islands herds during the period 2001-2016. The adjustment gives a better perspective of population trends and indicates positive growth in the last five years (Figure 1). Annual registrations in Mainland herds now are threatening to exceed 200 with circa 80% of total registrations. The Islands population continues to show a slight decline but there are signs it may be stabilising.

Figure 1
Annual registrations of calves



For several years I have used annual calf registrations to determine both the security and status of a breed and the number of breeding cows using a formula of 4 breeding cows per female calf registered. On that basis the breeding herd now numbers almost 1,000 cows.

Genetic analyses

Selection of a suitable bull as a herd sire is a vital part of any process of breed improvement, and is the primary focus of these reports. The SCBA website gives members access to data on inbreeding and coefficient of coancestry (kinship), and the SCHBS website has a kinship analysis page. In the last two reports I have highlighted the dangers of following rigid 'rules' regarding kinship. It is important to maintain diversity and a good balance of breeding lines within the breed but beyond that any breeder will understand they must not compromise on the quality of their herd sire.

This report gives good warning of any impending genetic crisis (see references to Heather dominance later) but it also points to bulls which combine good quality with maintenance of the genetic health (diversity) of the breed. None of the bulls recommended would upset the balance of lines. The selection of a bull as herd sire or for an individual mating not only needs to help to balance the founder lines but also to inject his own desirable quality into a breeding programme. Together they will ensure the ongoing improvement of the breed.

One factor affecting erosion of diversity is the potential loss of a founder line or family. Although founder lines are being conserved successfully there is a continuing need for vigilance and priority use of GCI to maintain the sustainable viability of the breed. The loss of a female family (i.e. in direct tail female) is significant as it possesses mitochondrial DNA unique to that family. Similarly the loss of a bull line in direct tail male will cause the loss of alleles associated with its Y-chromosome. GCI (which was explained in the 2016 report) measures how successfully the range of founder genetics has been maintained.

GCI

Measurement of GCI of Shetland cattle since 2002 (Table 1) shows it has been virtually stable indicating a relatively healthy state. GCI measures the contribution of founder animals to the current population and the greatest loss of founders occurred during the interval between renewed publication of the new herd book in 1981 and the commencement of these reports in 2001.

Table 1

Loss of Founders 1981-2017

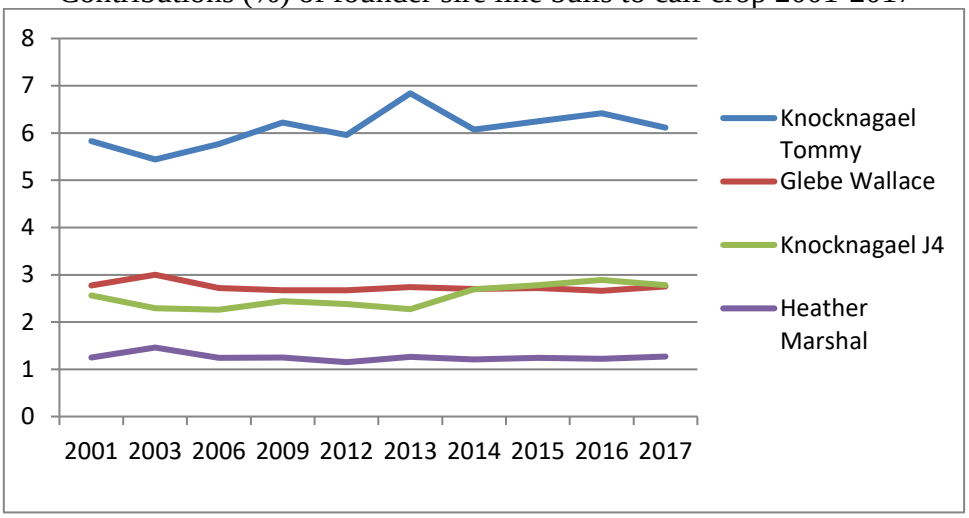
Measure	1981	1999	2002-5	2006-9	2012-5	2016	2017
Active ancestors and founders		798	909	1056	1386	1550	1567
Active male founders*	28	25	25	25	25	24	24
Active female founders*	66	53	47	48	48	48	49
Total active founders*	94	78	72	73	73	72	73
GCI			32.63	31.59	31.57	30.67	31.21

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

Loss of contribution from a founder (i.e. extinction of that line) is a significant and irretrievable loss. No founder influence has been lost since 2001, but those that have not survived in direct tail male or tail female will still have lost genetic material (Y-chromosome or mitochondrial DNA – see above). Thus descendants of founder Knocknagael Mary, which we feared had been lost, still remain in the breed through Lincwold Lowden, but not in direct tail female. Similarly, founder Foula Dandy is a potent influence in the breed but not in direct tail male. Other families are only intermittently active, but all credit is due to breeders of Shetland cattle for the conservation of founder lines and families in the last 17 years.

Bull line founders and HB Volume One representatives:

Figure 2
Contributions (%) of founder sire line bulls to calf crop 2001-2017



The largest male founder contribution (Figure 2) comes from Knocknagael Tommy (6.11%), but the contributions of the four founders of the remaining sire lines have been stabilised for the last decade.

Two Knocknagael cows, A1 (dam of Knocknagael Rory) and C1, have been identified as important founders, and it is worth noting that careful selection of specific cows to establish their herd by many breeders shows they recognise female merit. Maternal traits play a significant role in the productivity of a dual-purpose breed – traits such as regular breeding, ease of calving, milk yield and longevity.

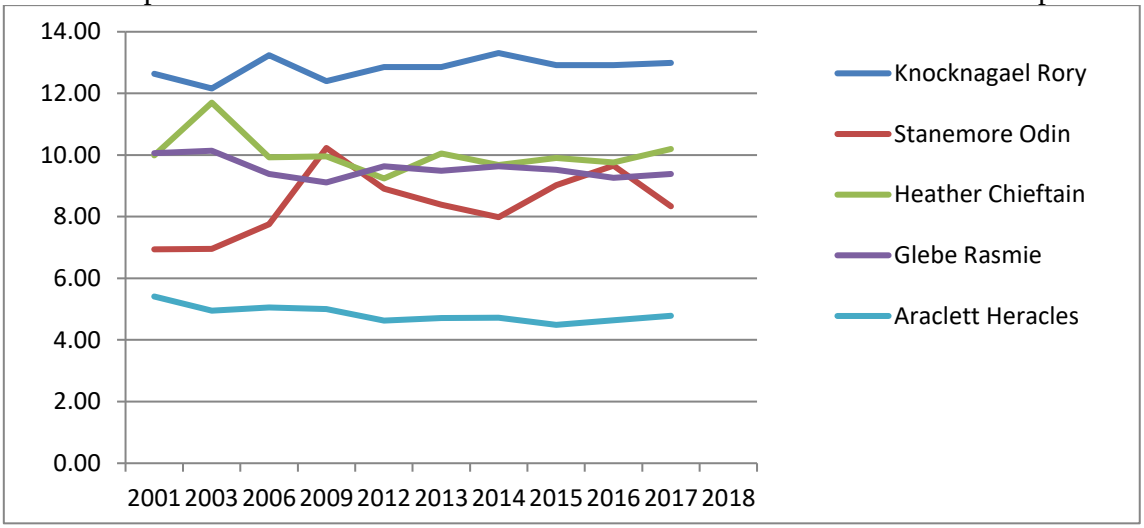
Any breeder will be able to give examples of animals that excel in these traits and already I am aware of the great longevity demonstrated by Collafirth Rowan (1996). She died at almost 22 years of age, and was 19 when her last registered progeny was born. She had a very level balance of the four sire lines in her pedigree. Her sire, Benston Brutus, was a g-g-grandson of Stanemore Odin, and her maternal grand-dam was the daughter of a Foula Dandy/Foula mating. Benston Elsie (1999) is hard on her heels. She still is alive, produced a calf when she was 19 and reinforces both the Aralett and J4 lines. She is by St Trinians Mansie and from the Murrister Speggirie line. Thus both Brutus and Elsie combine the J4 sire line with the Speggirie family. Firva Louanna (1988) was a regular breeder and produced 15 calves in the St Trinians herd including good bulls such as Lawrie, Appatchy and Rory.

The corollary also applies. Some cows may have a negative influence. Waterloo Charlie was a strong improving influence but his son, Knocknagael Charlie, failed to impress in at least two herds. Therefore the credentials of his dam, Knocknagael Sandy (Geldron Maestro x Knocknagael Hivdi), should be subjected to critical scrutiny. For example, both she and her dam produced only one registered offspring which is not a positive indicator of either regular breeding or longevity.

The pattern of influence of the main representatives of the four sire lines in Volume One (1981) of the Herd Book (Figure 3) shows some volatility but has remained reasonably steady and reservations regarding the increase in Heather influence are discussed later in the report.

Figure 3

Comparative contributions of HB Volume One bulls to 2001-2017 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 threat of the Collafirth Rasmie (92.1540) and Templeson Boris (93.1680) genetic bottleneck is now confined primarily to the Islands. Their influence has been reduced but still remains at a relatively high level (Table 2) and some young bulls have the potential to resurrect the problem (see Islands report below). It is too early to lose sight of the danger completely.

Table 2

Changing influence of C. Rasmie and T. Boris 2012-2017

Bull	Location	2012	2013	2014	2015	2016	2017	%+/-
Collafirth Rasmie	**Islands**	**8.13**	**7.83**	**6.96**	**5.09**	**6.57**	**7.33**	**-9.8**
Collafirth Rasmie	**Mainland**	**2.93**	**2.83**	**2.79**	**3.28**	**3.17**	**3.08**	**+5.1**
Templeson Boris	**Islands**	**8.28**	**8.76**	**6.56**	**5.39**	**5.24**	**7.05**	**-14.9**
Templeson Boris	**Mainland**	**3.39**	**2.90**	**2.97**	**3.27**	**3.20**	**3.24**	**-4.4**

The influence of Boris and Rasmie on the Mainland has been steady and does not merit special attention.

Influence of young bulls on 2017 crop of calves

Mainland

One problem succeeds another! The receding danger of Boris/Rasmie influence on the Mainland had been replaced by the emerging dominance of Heather genetics. Warnings of the Heather trend in recent reports seem to have gone unheeded. I think the current results cannot be ignored. Half of the 10 young bulls that contributed most strongly to the 2017 calf crop were noted as "heavy concentration of Heather". Taken in conjunction with the overall dominance of Heather genetics, and its more extreme dominance in the Islands and among bulls available by A.I., it is essential for Mainland breeders to adjust their selection of bulls to correct the imbalance which is increasing. Only Carn Bhren Inuus and Blazefield Rufus reduce Heather influence; the latter is dead but the former still is available for breeding.

Table 3

Contribution of young bulls to 2017 crop of calves on the Mainland

(Bulls marked * now believed dead) (2016 figure in brackets)

Bull	Born	Contribution	Notes
Challenger Artemis*	2013	3..46 (1.60)	
St Trinians Red Gust*	2015	2.39 (nil)	Heavy concentration of Heather
Carn Bhren Inuus	2014	2.13 (0.27)	**Reduces Heather influence**
Meadow Rusty*	2013	2.13 (0.53)	Heavy concentration of Heather
Wharncliffe Kirk	2014	2.13 (nil)	
Carn Bhren Guga	2012	1.93 (1.07)	Heavy concentration of Heather
Hollington Imperial*	2014	1.86 (1.07)	Son of Trondra Arrow; good balance of lines
Roland Euan*	2015	1.86 (nil)	
St Trinians Finarlie*	2013	1.60 (nil)	Heavy concentration of Heather
Broadacres Ivan*	2014	1.60 (0.27)	Heavy concentration of Heather
Blazefield Rufus*	2012	1.33 (1.74)	**Reduces Heather influence**

Islands

The Boris/Rasmie problem still is lurking in the Islands, but now has been joined by a further cause of imbalance. Seven of the nine young bulls contributing most to the 2017 calf crop have a heavy concentration of Heather genetics (Table 4) and three of those also have a simultaneous concentration of Boris/Rasmie (Geldron Aert, Geldron Brydon and North House Victor – the latter being an A.I. bull). Only Collafirth Tyson (and some A.I. bulls) has the potential to correct the balance.

Table 4

Contribution of young bulls to 2017 crop of calves on the Islands

(Bulls marked * now believed dead) (2016 figure in brackets)

Bull	Born	Contribution	Notes
The Point Jacobite	2015	15.48 (nil)	Concentrated Heather and Glebe influence
Collafirth Louis*	2013	7.14 (10.23)	Heavy concentration of Heather
Ocraquoy Haldor	2014	7.14 (nil)	Heavy concentration of Heather
North House Victor*	2013	3.57 (nil)	High Heather; concentrated Rasmie
Geldron Brydon*	2013	3.57 (4.55)	High Heather; concentrated Boris
Carn Bhren Halcyon	2013	3.57 (1.14)	
Isleburgh Finn*	2015	2.38 (nil)	High Heather
Geldron Aert*	2012	1.79 (1.14)	High Heather; concentrated Boris and Rasmie
Collafirth Tyson	2013	1.79 (3.41)	**Good balance of lines**

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

Recommended bulls used in 2017 or intended to use in 2018

My comments in the opening paragraph of this report are particularly relevant to this section. Some members may wish to focus less on historical analyses and more on breeding animals currently available. The feedback I received from members last year included advice that bulls I had recommended in the report already were on somebody's dinner plate. Welland Down Flodden, Carn Bhren Irish and Trondra Eiran were three such bulls. They all had

potential to make an important contribution to the genetics of the breed, but were culled prematurely. Why does that happen? Maybe the owner was unaware of the significance of his bull; maybe a bull's temperament was ruined by bad management (that should be a welfare issue); maybe an owner paid too much attention to the concept of kinship or over-use, both of which were put in context in the recent reports. Whatever the reason, I would be grateful for the earliest advice on any bulls that have been culled, or may be culled.

Therefore the focus of this report is being directed much more (subject to the information available to me) to evaluation of bulls which currently are available. I received information on more than 150 bulls that were used in 2016 or expected to be used in 2017 and/or 2018, or being retained for possible future use.

Islands

Warning flags have been waved during the last two or three years regarding the concentration of breeding in the Islands of Heather genetics, and Glebe genetics to a lesser degree. If the warning (which has been repeated this year) is not heeded there is a real danger of the Islands genetics entering another bottleneck. More than half the 37 bulls used or potentially available for breeding in 2016 and 2017/2018 were from the Heather line; in contrast only 4 were from the Knocknagael and Araclett lines combined. The overall Heather influence is 25% higher than the Glebe influence and as great as the Knocknagael and Araclett influences combined. There are scarcely any bulls in the Islands capable of correcting this dangerous trend. Collafirth Odin and Gillarunna Thor could have done so but it seems they had no progeny born in 2017 and were not used in 2017. Two other useful bulls had progeny in 2017 and hopefully in subsequent years.

Carn Bhren Halcyon (2013) belongs to the Heather sire line but he has a good balance of lines. He is by Gillarunna Innes out of a Carn Bhren cow, and his pedigree has a low level of both Templeson Boris and Collafirth Rasmie.

Collafirth Tyson (2013) was used in 2016 and 2017 and retention of a good son or sons as a potential herd sire would carry his quality forward. He belongs to the Heather sire line but in good balance with other lines. His dam was 11 years old when he was born. He has Hjem Lowrie, Troswick Beach and Collafirth Jamie close up in his pedigree; he reduces the level of Knocknagael Rory; and Collafirth Rasmie and Templeson Boris are almost absent from his pedigree.

Scotland

The bulls available for breeding in Scotland showed a better balance between lines although Heather and Glebe still are rather more dominant, especially the latter, and therefore Araclett and Knocknagael line bulls should have priority. Four suitable bulls were noted that had progeny in 2017, plus a further three young bulls joining the team a year later. They all will help to further balance the lines, and also have low levels of Collafirth Rasmie and Templeson Boris.

Carn Bhren Irish (2014), a red bull from the Knocknagael line, was highly recommended in the report last year and he may have calves on the ground this year. He now is dead but he leaves a son who can step into his shoes.
Stenscholl Paddy (2016), a red and white bull out of Broadacres Zoe, is a worthy son of Irish. He will reduce the Heather influence and has negligible levels of Rasmie and Boris. He deserves to join some quality cows to breed good sons.

Rogiavi Hamelin (2017) brings some older lines into his pedigree. He is by Garths Adonis, one of the early A.I. bulls and therefore belongs to the Araclett line. Rasmie and Boris are absent from his pedigree, and he has very little Heather genetics.

St Trinians Balou needs no introduction. He is an outstanding black-brindle bull. Apart from being an excellent physical specimen, he not only represents the Araclett line but also boosts Knocknagael influence. He also is available through A.I.

Carn Bhren Inuus (2014) was recommended in the report last year. He is a brown-brindle son of Balou, out of a daughter of St Trinians Mansie; an impressive pedigree, from which Rasmie and Boris are almost absent.

Carn Bhren Lazarus (2017) is a son of Inuus and thus perpetuates the Araclett sire line. He also has a good balance between the lines.

Trondra Arrow is another bull that needs no introduction. Previous reports have noted his superb quality and temperament. He is a son of Collafirth Laxness (Knocknagael line) and from a cow of a noted Trondra Inga family. There is no Boris in his pedigree, and only very little Collafirth Rasmie. He is also available through A.I.

<u>England/Wales</u>

I have a list of more than 90 bulls which may have been used in England and Wales in 2016 and later plus young bulls that may come into service. The potential width of selection is encouraging, and there is a better balance between sire lines. Superficially it looks very promising but the danger signs should not be ignored. The trend towards dominant Heather influence is confirmed by the analysis of calves born in 2017. Reference to the leading young sires (Table 3) leaves no room for doubt. Evaluated in conjunction with the dominant position of Heather genetics in the Islands it is imperative the Mainland population gives priority to bulls which strengthen the Knocknagael and Araclett lines. The report last year stated it would "be prudent to give attention" to those lines. The situation now makes such action essential.

I have detailed below 18 bulls with stronger Knocknagael and/or Araclett genetics which I wish to recommend to you. It may be that some are already dead, while others have not yet been used, but the choice remains wide.

Blazefield Rufus (2012), a red-and-white bull, had progeny in 2017 but now is dead. His sire is a grandson of St Trinians Mansie (J4 line) and his dam is a daughter of Waterloo Charlie to whom he is linebred.
He is the sire of **Whinpot Jackdaw** (2014) and **Whinpot Red Adair** (2014) although neither had progeny in the 2017 crop.

Blazefield Beano (2013) remains in service and had progeny in 2017.
His son, **Oxmoor Dandy** (2015) has a good balance of lines and low level of Rasmie and Boris. Another son, **Oxmoor Donn Carr** (2016) has similar credentials.

Lincwold Fergal is an older bull worth noting with progeny in the 2017 crop although he now is dead. He is a son of Tivis Hill Keen and offers a good mix of lines.

He also is the sire of the grand-dam of **Balmas Archie** (2016) which, like Rogiavi Hamelin in Scotland, is by an early A.I. bull (Stanemore Odin) and thus brings valuable old genetics into the mix.

Welland Down Flodden (2014), also dead, was noted in the report last year as a valuable breeding bull which traced down his dam's line to Trondra Inga.
His son, **Wild Meadows Charles** (2016), is equally interesting and valuable. His carefully planned breeding is Welland Down both sides, and several lines trace back to J4 (Knocknagael).

Cwrdu Morgan (2012) is a son of St Trinians Lawrie, and has a good balance of lines.
St Trinians Lucky Seven (2012) has similar credentials although rather higher levels of Boris and Rasmie.

Randolph Maximus (2014) has a valuable and unusual pedigree. His sire is Aidlew Angus and his dam is linebred strongly to St Trinians Rory.

Broadacres Bruce (2013) is a son of Gillarunna Innes and therefore from the Heather sire line, but Knocknagael and Glebe are the strongest elements in his pedigree.

The remaining bulls on my list belong to the Glebe sire line, but again the combined influence of Araclett and Knocknagael is the most powerful factor.
St Trinians Hawthorn (2016), a b&w grey-flecked bull by St Trinians Grey Light out of a daughter of St Trinians Mansie, and **Rowland Jock** (2017) both have a good balance of lines.
Drumlough Isaac (2015) is by a Carn Bhren bull out of a daughter of Balou, but he has a relatively high level of Rasmie in his pedigree.
His son, **Lincwold Sonny** (2016) may be a better bet as he is strong on Knocknagael and Araclett and the influence of Rasmie has been diluted.

A.I. bulls

The value and opportunities afforded by the A.I. bulls have been discussed in previous reports. A few of the bulls have the potential to improve the balance between lines, but others will intensify the dominance of influences which already are too strong. The combined Heather/Glebe influence in the pedigrees of A.I. bulls is almost twice as high as that of the combined Araclett/Knocknagael lines.

There is a need to prioritise the use of bulls that correct this 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.

The other aspect of the A.I. stud that should be noted is 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

There remains some concern regarding low numbers on the Islands, and the danger of the increasing dominance of Heather genetics is a problem that needs to be addressed. The absence of available bulls on the Islands to correct this imbalance of lines, without recourse to the small number of suitable bulls on the A.I. team or importation of breeding bulls from the mainland, is a source of serious concern.

Nevertheless the breed continues to generate a sense of optimism, and the growing breeding population justifies a positive outlook. Annual registrations again have exceeded 200, the Boris/Rasmie problem has been controlled on the Mainland, no lines/families have been lost in the last 17 years, and there are some quality bulls available which allow the opportunity to maintain a good balance of lines. There are sufficient resources to sustain the current momentum provided they are used wisely and effectively.