Shetland Cattle: Breed Analysis Report; November 2014

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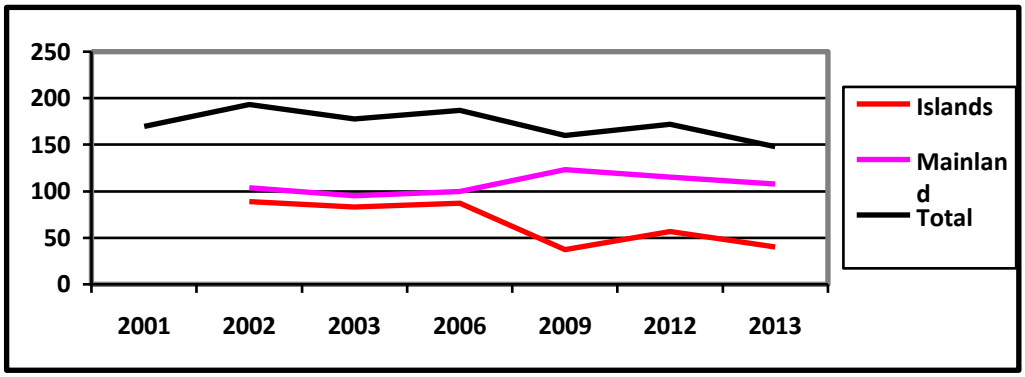
Although we kept track of the population of Shetland cattle previously, the systematic regular analysis of the annual calf crop did not begin until 2001. Since that time it has been possible to have a clearer understanding of the structure of the breed and to identify any potential problems or note preferred breeding plans. Last year I reviewed progress during the decade 2003-2012, but in this report I have taken the opportunity to extend the comparisons to cover the whole period 2001-2013. Some of the news is good, while some issues deserve more critical evaluation, but hopefully the report will enable useful decisions to be taken at both breed and herd level. Although I write the report it is a team effort which has relied on help and cooperation from Alan Yarker, Peter Hardman, Paddy Zakaria, Albin Smith, Barry and Cath Allen and many other members who provided information.

The report follows the approximate format of previous years in order to facilitate easy comparison.

Population trends

Annual calf registrations are the preferred indicator of a breed's security and easier to record than the number of breeding cows or other measures. Total registrations in 2001 were 170, although FMD undermined confidence in that year. Numbers increased in the next few years as the breed continued to expand, but the impact of the economic downturn of 2007/8 was a setback which is reflected in the reduced registrations in 2009 (Figure 1), and thereafter a more rigorous application of commercial values led to more delayed registrations and crossbreeding. It is interesting to see on the website Charolais and Salers bulls running with herds of Shetland cows As a result, registrations in 2013 fell to 148 calves.

Figure 1
Annual registrations of calves



Apart from the overall reduction in registrations, which now appears to be a trend rather than a blip, a further ongoing cause for concern is the shifting balance between registrations in Shetland (Islands) and those on the mainland of UK (Mainland). In 2002 and 2003 the ratio was almost 1:1, but in 2013 the ratio was 1:2.5 showing a

decline of more than 50% in registrations on the Islands whilst, during the same period, the Mainland population remained at about the same level. I highlighted the situation last year, but felt it was important to mention it again in view of the deteriorating situation. I have no ready answer or solution, and can only repeat my previous sentiment regarding "the need for the maintenance of an effective breeding population of the breed in its native environment on the Islands and this must continue to be a high priority". Historically the breed benefitted from financial incentives provided by the SIC, and maybe subsidy is a necessary ingredient for a heritage breed.

Genetic analyses

Rasmie and Boris

In the report last year, I devoted some space to an analysis of the strong influence of Templeson Boris and Collafirth Rasmie and the related 'genetic bottleneck' effect, noted almost from the beginning of these reports. Although both bulls came to prominence initially as a result of increasing demand for red animals, they also possessed other desirable traits which reinforced their popularity. However, even in breeds with a large population, such as Holstein, the dangers of focusing too heavily on one or two lines have been realised. In a small population the dangers are multiplied significantly, and therefore I make no apology for reiterating my advice and showing the situation in comparisons with two contemporaries (Table 1). Currently the danger is greatest on the Islands, but other good sire lines are available (see Regional Effects - Islands section below) although the continuing influence of bulls such as Hillwell Nonny (concentration of Collafirth Rasmie lines plus one line of Templeson Boris) makes dilution of the effect more difficult.

Table 1
Changing influence of four bulls 2003-2013

Bull	Location	2003	2013	Change %
Collafirth Rasmie (1992-1540)	Islands	7.55	7.83	+3.71
Collafirth Rasmie (1992-1540)	Mainland	3.63	2.83	-22.04
Templeson Boris (1993-1680)	Islands	5.38	8.76	+62.82
Templeson Boris (1993-1680)	Mainland	4.46	2.90	-34.98
Couster Copper (1990-0290)	Islands	5.29	4.41	-16.63
Couster Copper (1990-0290)	Mainland	1.33	2.85	+114.28
Isleburgh Dexter (1992-1374)	Islands	4.29	0.43	-89.98
Isleburgh Dexter (1992-1374)	Mainland	1.58	2.53	+60.13

Boris and Rasmie have not exerted such an intense attraction on breeders on the Mainland and the use of their descendants has been more moderate. Nevertheless a careful watch should be kept on future developments.

Effective founder number:

Genetic diversity of a breed, essential for a sustainable population, results from the diversity which existed in the founder population and subsequent effects of inbreeding. Thus it is sensible to avoid the loss of the genetics of any founder animal, and to exercise inbreeding prudently to avoid inbreeding depression. Maintenance of

founder population diversity is measured as effective founder number and this has been maintained since 2001 at about 32 (Table 2) which is a healthy standard for a rare breed. The stability of the effective founder number and the steady rate of increase in the number of active ancestors are encouraging signs. The number of active founders can vary a little from year to year depending on which calves are registered, and occasionally an apparently extinct family can re-emerge – the Knocknagael Jolina family is an example. Only one family seems to have disappeared. Descendants of Knocknagael Mary traced down through a tenuous line to progeny of Templeson Timothy in the Wimpole herd in the 1990s. They were last noted in 2001, and the family is likely to have become extinct unless any member has other information. There are some alarming examples of close inbreeding, but in general it has remained within reasonable limits. Young bulls currently average about 8% coefficient of inbreeding (range mainly 5% to 14%) which is reasonably safe.

Table 2
Measures of within-breed diversity

Measure	**2001**	**2004**	**2007**	**2009**	**2013**
Effective founder number	32.41	32.26	32.04	31.62	32.23
No. of active founders	77	80	76	79	75
No. of active ancestors	798	905	1051	1056	1235

The declining numbers of the Islands population (Figure 1), and the associated dangers, is demonstrated by the number of active ancestors - a number which increases automatically with each extra generation since the foundation of the herd book (Table 2). While 92% of the total active ancestors in 2013 are represented on the Mainland (1138), only 45% are found on the Islands (554). If the trend continues it is inevitable that Islands breeders increasingly will need to access Mainland genetics.

Bull line founders and HB Volume One representatives:

Figures 2 and 3 are included simply as a reference point as little change has been seen in last thirteen years. The contributions of the four founder bulls (Figure 2) remain relatively constant, as do those of the Volume One representatives (Figure 3). Glebe Rasmie is a descendant of Glebe Wallace, Heather Chieftain of Heather Wallace, Stanemore Odin of Knocknagael J4 and Araclett Heracles of Knocknagael Tommy.

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

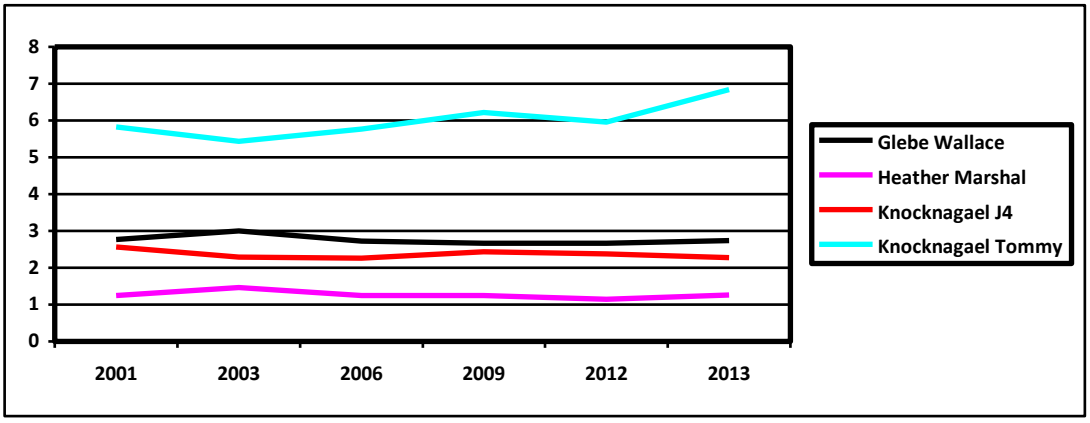
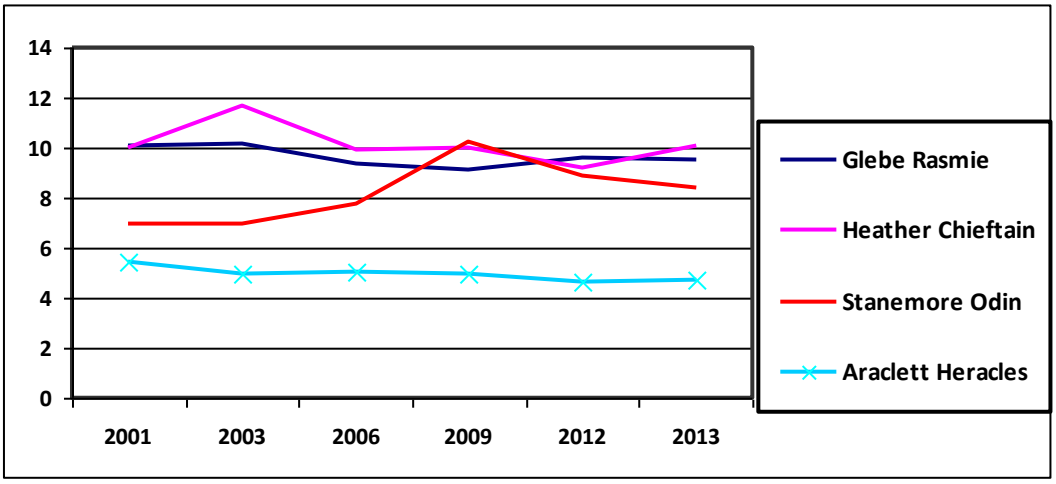


Figure 3
Contributions (%) of HB Volume One bulls to calf crop



Note: These contributions are for comparative purposes only between the animals in Figures 2 and 3. They can not be compared with the % figures in other Tables.

Young bulls

One purpose of this report is to give some guidelines for future breeding policy, and details of bulls still available for service and bull calves coming through the system have enabled much more relevant advice to be given. In an ideal world outstanding bulls would exert their influence in more than one herd, always with the proviso that their wider use does not threaten diversity within the breed. However, despite the extra information available to us, bulls often are culled before their value is realised, usually because their daughters reach breeding age, and their merit must be retrieved through their sons. Thus on the Islands and in Scotland bulls such as Collafirth Laxness, St Trinians Balou, Gillarunna Innes (linebred to Murrister Olympus), Struiehill Saturn and Gillarunna Nocturne have deservedly earned a good reputation and it is encouraging to see that bulls intended for use in 2015 or later continue the influence of these bulls (see Regional Effects – Islands below). They include Trondra Arrow (very good 2009 son of Laxness), a Carn Bhren son of Innes (Halcyon 2013), a Carn Bhren calf (Irish) by Ustaness Petroni (son of Laxness), another Carn Bhren calf (Inuus) by Balou, while Gillarunna Nocturne and St Trinians Balou are both likely to remain in service in 2015.

In England and Wales there also is a strong group of young bulls coming through to consolidate the improvement created by sires mentioned and recommended in earlier reports. Lincwold Lowden (2011), linebred to Tivis Hill Keen, and Broadacres Bruce (2014), a son of Innes, both give continuity to established lines, but there also is a wealth of other lines in other pedigrees.

Regional effects

Mainland

The previous (2012) crop of calves showed an increase in the influence of the dominant lines from the Islands, which would have been a matter for concern if it had

intensified, but the 2013 crop indicates a return to a good balance of bloodlines among the most influential young sires (Table 3). Dominant Islands genetics are represented by Collafirth Viking, Templeson Spice, St Trinians Ghost and his son Jock, but the leading bull is Hollins Gustav (2008). Gustav, a son of St Trinians Curan which also appears in the list, has Struiehill Saturn, Troswick Beach and Hjem Lowrie close up in his pedigree and, although Boris appears on his dam's side, it is good he has stayed in service. Sometimes even the recent pedigree can be misleading. Tolsta Diogenes is linebred to Struiehill Saturn but nevertheless his deeper ancestry is dominated by Templeson Boris (18%). It is interesting to see that some breeders are practising linebreeding to selected bulls (e.g. Gillarunna Innes linebred to Murrister Olympus; St Trinians Curan linebred to Troswick Beach), while other bulls such as Maxfield Peter and Boquhapple Kelvingrove offer valuable bloodlines. Intense inbreeding (23%) was noted in one bull, Randolph Fergus, which had only one great grandsire, St Trinians Rory – a great grandson of Troswick Beach.

Although Ustaness Petroni (Mainland) and Ustaness Quince (Islands) are both by Laxness, none of the bulls listed in Table 3 have made any contribution to the Islands population, and this will permit more effective exchange of genetic material in the future.

Table 3
Contribution of young sires to 2013 crop of calves on the Mainland
(2012 figure in brackets)

Bull	Born	Contribution	Notes
Hollins Gustav	2008	3.70 (1.96)	son of St Trinians Curan
Maxfield Peter	2008	3.01 (0.87)	grandson of Carrbank Dominic
Collafirth Viking	2010	3.01 (3.91)	Hillwell sire line but also other lines
Gillarunna Innes	2007	2.78 (3.07)	linebred to Murrister Olympus
St Trinians Jock	2011	2.78 (nil)	son of St Trinians Ghost
Templeson Spice	2010	2.31 (3.48)	Hillwell sire line
St Trinians Curan	2006	2.31 (1.41)	linebred to Troswick Beach
Ustaness Petroni	2007	2.31 (1.74)	son of Collafirth Laxness
Boq. Kelvingrove	2009	1.85 (1.74)	
Carn Bhren Ethelred	2010	1.85 (0.43)	son of Ustaness Petroni
Hengistbury Acer	2010	1.85 (1.30)	
St Trinians Ghost	2009	1.85 (0.43)	Hillwell Nonny is double grandsire
Wharncliffe Ewan	2011	1.85 (0.87)	

Looking to the future in England and Wales, almost twenty young bulls have been brought to my notice and several that will be working in 2015 or later are worthy of note. Last year I mentioned in particular Aidlew Angus, a son of an A.I. bull, Garths Adonis. He no longer is available but he belonged to the Araclett sire line and his dam was a daughter of Stanemore Odin, and he has left two well-bred Randolph sons, **Maximus** (2014) and **Douglas** (2013). I also made particular mention of **Blazefield Rufus** (2012) which worked in 2014 and now is for sale. He is a grandson of Carrbank Morris (Knocknagael sire line) and his dam was a daughter of Waterloo Charlie – a great opportunity to buy a very well-bred bull. A similarly bred bull is **Cwrdu Morgan** who is linebred to Waterloo Charlie. A bull that offers access to unusual branches of good bloodlines is **Meadow Rusty** (2013), by Hollins Jack of Hearts out of Meadow Nicky. I mentioned **Lincwold Lowden** (2011) in a previous report and he is linebred to Tivis Hill Keen (sire linebred to Stanemore Odin and dam

a very good mix of Glebe, Heather and Araclett lines). **Broadacres Bruce** (2014) also has a good mix of lines and is by Gillarunna Innes.

Four bulls likely to be in service in Scotland in 2015 catch the eye. Three belong to the Knocknagael sire line, which is not well represented in the Islands. **Trondra Arrow** (2009 son of Collafirth Laxness) is "an exceptionally good-looking bull with a great temperament", and he also has a son (Hollington Imperial 2014) destined to work in England; **St Trinians Lucky Seven** (2012 great-grandson of Curan) brings a good balance of interesting lines; and **Boquhapple Kelvingrove** (2009 red bull) also has a good mix of lines. The fourth bull is **Gillarunna Ollie**, a 2010 son of Nocturne from the Glebe sire line. In addition there are two Carn Bhren 2014 calves that may be fit to work in 2015. **Inuus** (brown brindle) is a son of St Trinians Balou and has an impressive pedigree, while **Irish** (red) is by Ustaness Petroni (son of Laxness) out of Drumlough Isobel (daughter of Balou).

Islands

The emergence of bulls such as Trondra Donnie, Knocknagael Charlie and Collafirth Laxness was noted as a positive development in 2009 and, although their influence still persists to some degree, the situation has regressed as noted last year. The leading 12 young sires of the 2013 calf crop (Table 4) are predominantly based on the Rasmie/Boris/Huxter axis, but it is encouraging that Charlie (a son of Waterloo Charlie) and Donnie still appear on the list to introduce some essential variation to the mix, and have been joined by Ustaness Quince (a son of Laxness) and Lyndthorpe Raymond.

The use of linebreeding has been noted above with reference to Mainland sires, and it also is evident on the Islands. Lyndthorpe Raymond is linebred to Boxmoor Fearless, and Ustaness Runna to Hillwell Huxter, but other animals are more severely inbred. A prime example is Hillwell Gerald (>30% inbred) who was out of Hamnavoe Loris by her own son. Other examples are Hillwell Nonny (21%) and Hillwell Luddy (20%) both of which owed 50% of their ancestry to St Trinians Spitfire (which himself was by Collafirth Mark out of his own daughter) as a double grandsire. Sometimes the level of inbreeding does not fully indicate the concentration of influence. For example, Geldron Verg (Table 4), a grey bull inbred only 9%, owes 33% of his ancestry to Collafirth Rasmie and Templeson Boris.

Table 4

Contribution of young sires to 2013 crop of calves on the Islands

(2012 figure in brackets)

Bull	Born	Contribution	Notes
Geldron Verg	2007	8.75 (7.89)	concentration of Collafirth Rasmie
Ustaness Quince	2008	7.50 (10.53)	son of Collafirth Laxness
Gerraquoy Lulach	2010	7.50 (6.14)	son of Hillwell Huxter
Lyndthorpe Raymond	2011	6.25 (1.75)	linebred to Boxmoor Fearless
Geldron Yackle	2013	5.00 (nil)	concentration of Rasmie and Boris
Hillwell Davy	2011	5.00 (nil)	inbred to St Trinians Spitfire
Knocknagael Charlie	2007	4.36 (2.19)	son of Waterloo Charlie
Ustaness Runna	2009	3.75 (1.75)	linebred to Hillwell Huxter
Geldron Xplain	2009	3.13 (nil)	son of Nonny; dam by Boris
Minarvi Ramsay	2008	3.13 (6.14)	concentrated Hillwell lines
Rockytoon Zulu	2011	2.50 (nil)	strong Boris influence

Trondra Donnie	2007	2.50 (5.26)	mix of lines

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

Opportunities to widen the choice of bloodlines further in the Islands are provided by several bulls intended for use in 2015. Four bulls in particular are worthy of note:

St Trinians Balou, a 2007 black brindle, is a big impressive animal. He belongs to the Araclett sire line but has significant elements of Stanemore Odin and Heather Chieftain in his pedigree.
Gillarunna Nocturne (2008) is from the Glebe sire line with Collafirth Rasmie as his great-grandsire, but is a good-looking bull with some fine progeny on the ground.
Collafirth Tyson (2013) is by Lyndthorpe Raymond (Heather sire line) but his dam is very interesting as a bull dam as she combines strong elements of Heather Chieftain, Stanemore Odin and Collafirth Foula.
Carn Bhren Halcyon (2013) also belongs to the Heather sire line, being by Gillarunna Innes out of a daughter of Nocturne.

A.I. Bulls

Although bulls in the Semen Bank have been mentioned in some previous reports, they have not featured prominently. Six bulls currently are available, namely:

Stanemore Odin (1975) is the Volume One founder of the Knocknagael sire line. Glebe and Heather influences are absent from his pedigree and Araclett only because of the presence of Knocknagael Tommy, and therefore his semen can be used with benefit on cows which have high levels of the other lines.
St Trinians Mansie (1994) is a son of the very good bull, Troswick Beach, and combines valuable older elements of the Knocknagael, Araclett and Glebe lines, together with a strong influence of Foula Dandy.
Garths Adonis (1980) is very closely inbred to Araclett Saturn, which comprises 44% of his ancestry and this limits his value.
Randolph Fergus (2007) is linebred strongly to St Trinians Rory and lightly to St Trinians Appachy – both sons of Firva Louanna, a notable dam of several bulls.
Galfrid Ashley (1988) and **Hengae Fearsome** (2005) both have a mix of lines.

Conclusions

A message that became increasingly clear as I wrote this report is that, although historical analysis is very important to understand the structure of the breed and define problem areas, a greater value is the ability to identify bulls that are calculated to improve the next generation whilst maintaining diversity to ensure the genetic health of the breed. I specifically identified seventeen bulls (7 in England/Wales; 6 in Scotland; 4 in Islands) and hopefully members will confirm their credentials, but there are several other bulls available and I hope these reports will stimulate greater interest in analysing bulls to identify which suits any particular circumstance or breeding policy. More particularly the decision whether to leave a calf entire as a potential herd sire is a vital link in the ongoing improvement of the breed, and these reports are intended to assist the decision-making process. A good number of working bulls on

the ground for natural service helps to reduce the potential problem of inbreeding depression, but the opportunity to use A.I. bulls can be useful in some circumstances.