Key Performance Indicators for the UK Guernsey dairy herd for the year ending 31st December 2012

A study of herd performance in 33 milk recording herds

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Introduction

While calculating production parameters for an individual herd is relatively straightforward, this does not answer the fundamental questions of "***Is that a good or acceptable level of performance?"*** and ***"Should this herd be doing better than it is?"*** These questions require comparison with the performance in a significant number of other similar herds.

This study provides up to date (December 2012) figures on the performance achieved by a sample of 33 commercial Guernsey dairy herds in the United Kingdom. The study presents 27 parameters that cover key aspects of herd production, fertility and health. The source of data is the monthly milk records obtained from National Milk Records (NMR).

The study demonstrates clearly the wide differences that exist in the industry between the "best" and "worst" levels of performance in commercial dairy herds.

For each parameter the performance levels of all 33 herds are presented in a bar chart. A median (middle) value and inter-quartile range (the level achieved by the middle 50% of herds) are derived for each parameter. A **target** value for on-farm use is proposed for each parameter, based on the performance level currently achieved by the **"best" 25%** of the herds for that parameter.

These parameters provide farmers and their technical advisers with key information to:

- benchmark and monitor the current performance of individual herds
- identify areas of relative strength and weakness in individual herds
- set realistic and achievable target values
- collaborate with other producers to identify reasons for good and bad performance, and learn from existing best practice

The findings also demonstrate to researchers and technical advisers the areas of greatest variation and potential for improvement.

This study is a repeat of that reported in 2011, where the analysis intended to provide an objective measure of national herd performance and how it is changing over time.

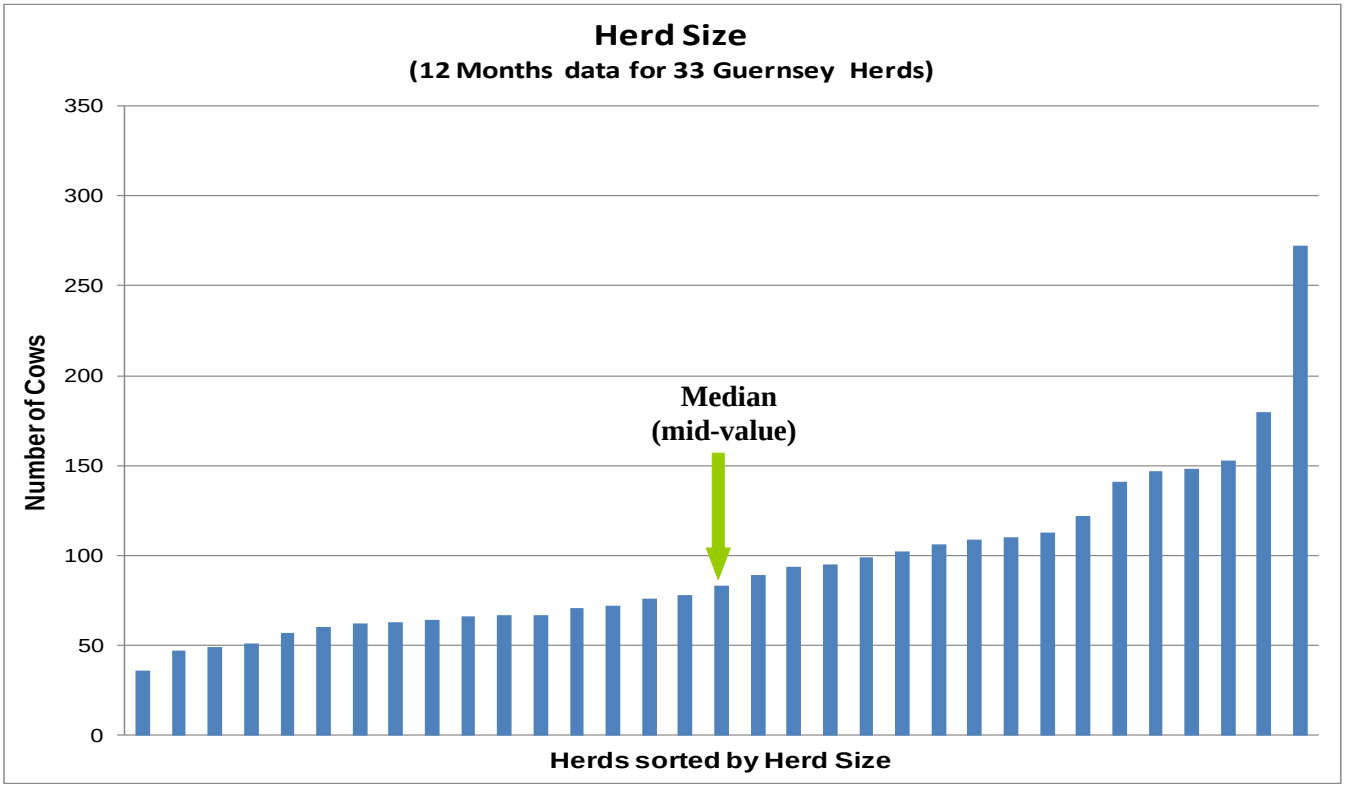
Following the analysis there is a section on the practical use of these parameters, using the InterHerd+ program, to facilitate the analysis of herd performance.

The sample of herds

The source of data is the monthly milk records obtained by National Milk Records (NMR). The 33 herds used in the study all fully milk record on a monthly assisted basis and represent large proportion of Guernsey herds recorded by NMR. Herds were selected using random numbers to ensure a representative cross-section of the sample. The herds are all predominantly comprised of Guernsey cows, and have recorded for a minimum of two years. Where possible the same herds used in the 2010 study were maintained for the 2012 sample. Herds with poor fertility data (inadequate recording of services and pregnancy diagnoses), as well as herds no longer recording, were replaced with herds selected using random numbers. In total 25 herds were in both the 2010 and 2012 studies.

Herd size for the 33 herds in the present study ranged from 36 to 272 cows, with a median value of 83 cows, as shown in Figure 1. In this sample 64% of herds were below 100 cows, with just one herd containing over 200 cows.

Figure 1. Herd size of the 33 Guernsey herds in the 2012 study



The parameters

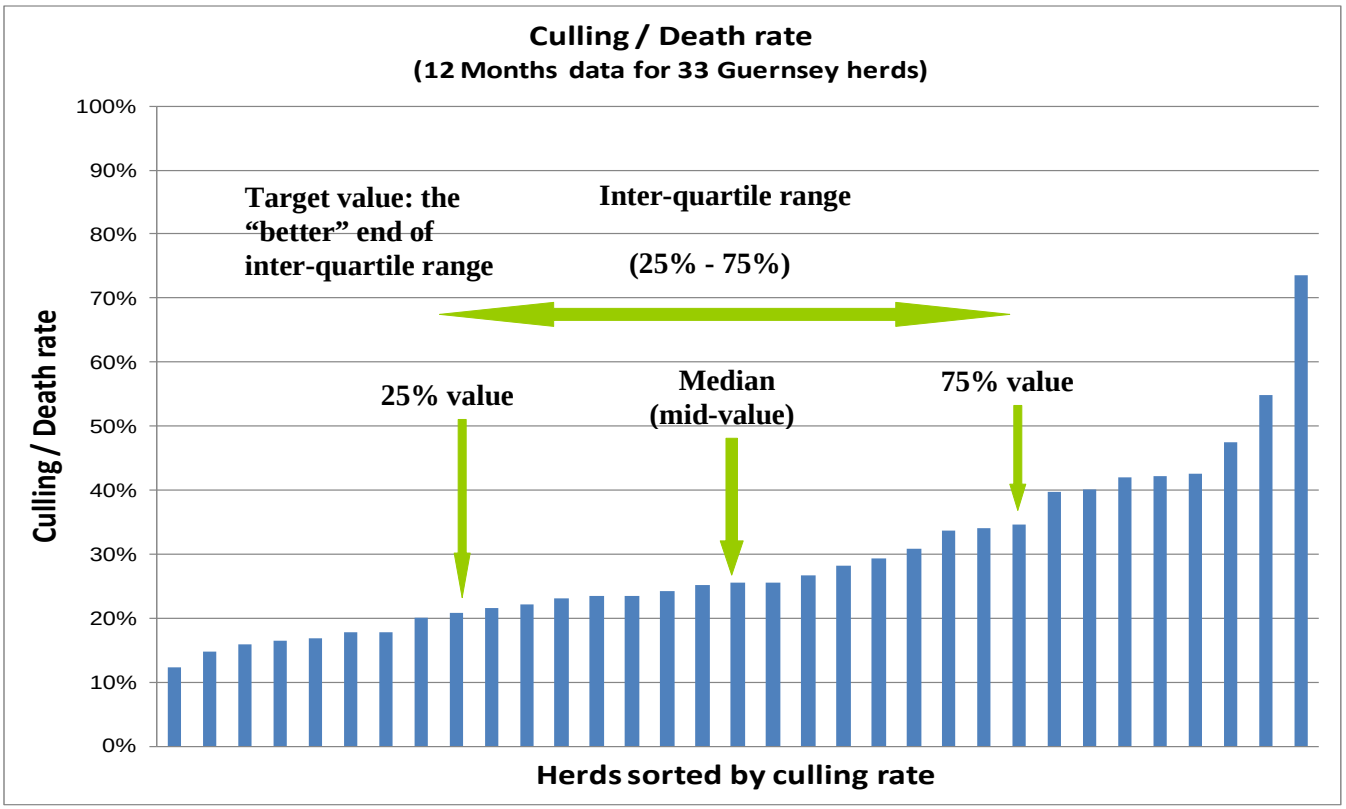
To minimize the impact of short term seasonal changes, the analyses are based on 12 month rolling averages for each parameter. In other words, they represent the performance levels achieved by each herd for the 12 month period from 1st January 2012 to 31st December 2012.

The results of the study are summarized in Table 1. For each parameter there are 4 values:

1. The **median**: The middle value. If the performance levels of all herds are arranged in ascending order, the median is the performance of the middle herd. In essence, half the herds do better and half do worse than the median value. For example, if the conception rates of 5 herds were arranged in ascending order, the median value would be the conception rate of the third herd, leaving 2 herds with better and two herds with worse performance.
2. The **first quartile (25% value) and third quartile (75% value)** describe the lower and upper limits of performance achieved by the middle 50% of herds. 25% achieve "better" and 25% achieve "worse" than the limits for that parameter.
3. The **target** value is the level achieved or bettered by 25% of the herds. This value is the "better" of the **first quartile (25%) and third quartile (75%) values.** For parameters like somatic cell count, culling % and calving interval the target will be the 25% (lower) value, while for others (conception %, protein %, dry period cure %) it will be the 75% (higher) value.
4. The **inter-quartile range** is the difference between the performance of the best and worst 25% of herds (i.e. the difference between the **first quartile (25% value) and third quartile (75% value)**.

The origin of these values is shown in Figure 2. Throughout this document the parameter value is displayed on the vertical Y axis with one bar for each of the study herds arranged along the horizontal X axis in increasing or descending order of the parameter value. The parameter in Figure 2 is the culling % so the target value is at the lower end of the inter-quartile range (a low culling % is preferable to a high culling %).

Figure 2. A description of the median, inter-quartile range and target values generated for each parameter



The definitions of each parameter are detailed in Appendix 1.

Acknowledgements

The authors are grateful to National Milk Records (NMR) for providing data to prepare this study.

Section 2: KPI Results for the year ending 31/12/2012

Table 1. Summary of Key Performance Indicators derived from analysis of 33 Guernsey milk recording herds

Parameter	Median (1)	1st – 3rd quartile (25% - 75%) (2)	Target (3)	Inter-quartile range (4)
A. Culling rate	25%	21% - 35%	21%	14%
B. Culling / death rate in first 100 days of lactation	5%	3% - 8%	3%	5%
C. Age at exit (years)	6.9	6.1 - 7.5	7.5	1.4
D. Age at exit by Lactations	4.0	3.5 - 4.6	4.6	1.1
E. Percentage Served by day 80	49%	40% - 55%	55%	15%
F. Percentage conceived 100 days after calving	20%	13% - 32%	32%	19%
G. Calving to 1st service interval (days)	89	78 - 105	78	27
H. Calving interval (days)	425	411 - 446	411	35
I. Age at 1st calving (years)	2.6	2.4 - 2.7	2.4	0.3
J. Conception rate	29%	25% - 33%	33%	8%
K. Percentage service intervals at 18-24 days	34%	28% - 41%	41%	13%
L. Percentage service intervals >50 days	27%	19% - 39%	19%	20%
M. Percentage eligible for service that served	27%	24% - 40%	40%	16%
N. Percentage eligible for service that conceived	9%	6% - 11%	11%	5%
O. Lifetime milk / cow / day (kg)	8	6 - 9	9	3
P. Milk / cow / year (kg)	5,235	4,757 - 5,867	5,867	1,110
Q. Average Protein%	3.64%	3.58% - 3.69%	3.69%	0.11%
R. Average Fat%	4.85%	4.70- 4.92%	4.92%	0.22%
S. 305-day yield (kg)	5,319	4,854 - 5,946	5,946	1,092
T. Average SCC ('000 cells/ml)	211	169 - 285	169	116
U. Percentage SCC >=200,000 cells/ml	26%	19% - 35%	19%	16%
V. Percentage SCC >500,000 cells/ml	10%	7% - 14%	7%	7%
W. Percentage 1st recording SCC >=200,000 cells/ml	21%	18% - 28%	18%	10%
X. Percentage chronic SCC >=200,000 cells/ml	15%	10% - 21%	10%	11%
Y. Percentage Dry period cure (High:Low)	63%	60% - 69%	69%	9%
Z. Percentage Dry period protection (Low:Low)	86%	77% - 93%	93%	16%
ZA. Percentage Low at end of previous lactation (SCC<200,000 cells/ml)	65%	51% - 78%	78%	27%

(1) The median is the middle value achieved for the parameter across all 33 herds (so 16 herds were better and 16 were worse than this value).

(2) The **first quartile (25% value) and third quartile (75% value)** describe the lower and upper limits of performance achieved by the middle 50% of herds. 25% of herds achieve "better" and 25% "worse" than the limits for that parameter.

(3) The Target is set at the level achieved by the "best" 25% of herds. So, depending on the variable, it is either the **first quartile (25% value) or third quartile (75% value)**.

(4) The inter-quartile range is the difference between the **first quartile (25% value) and third quartile (75% value)**.

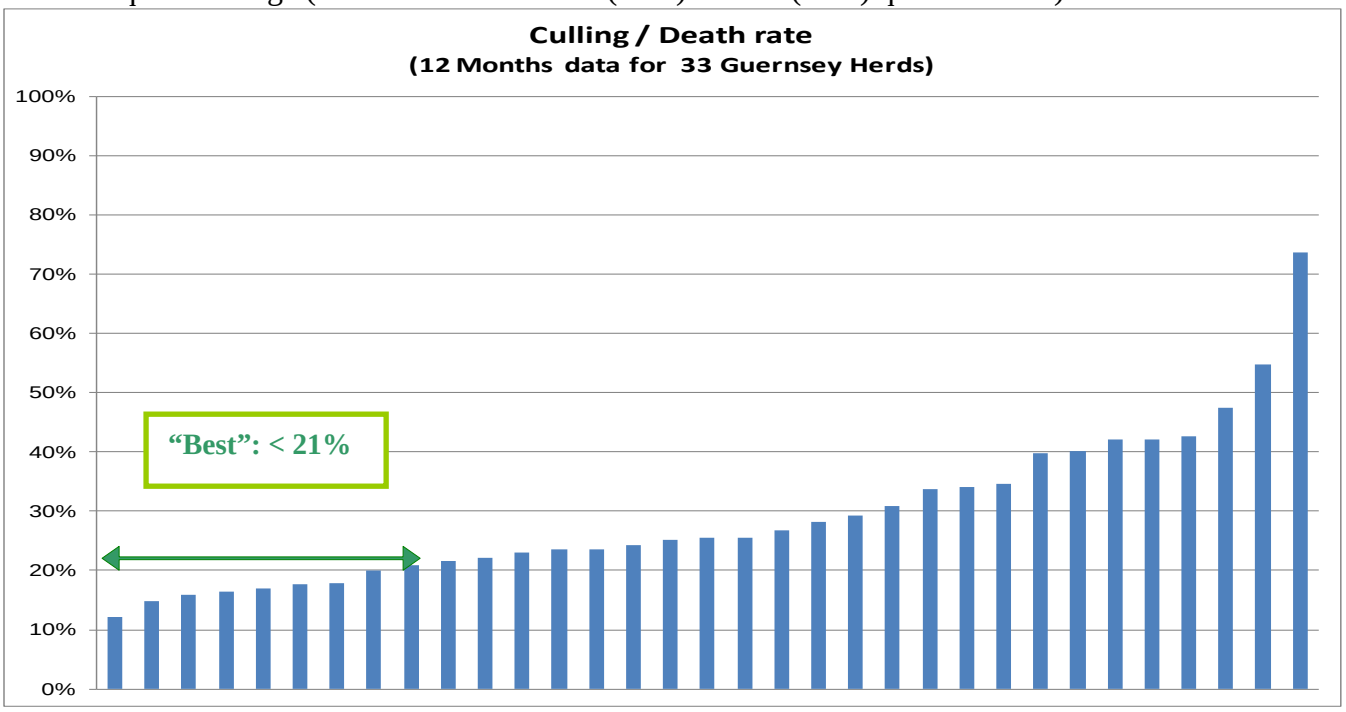
A. Culling/death rate: What percentage of all the cows were culled or died in the last 12 months.

Target (level achieved or surpassed by 25% of herds): 21%

Median (level achieved by the middle herd): 25%

75% level (level achieved or surpassed by 75% of herds): 35%

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 14%



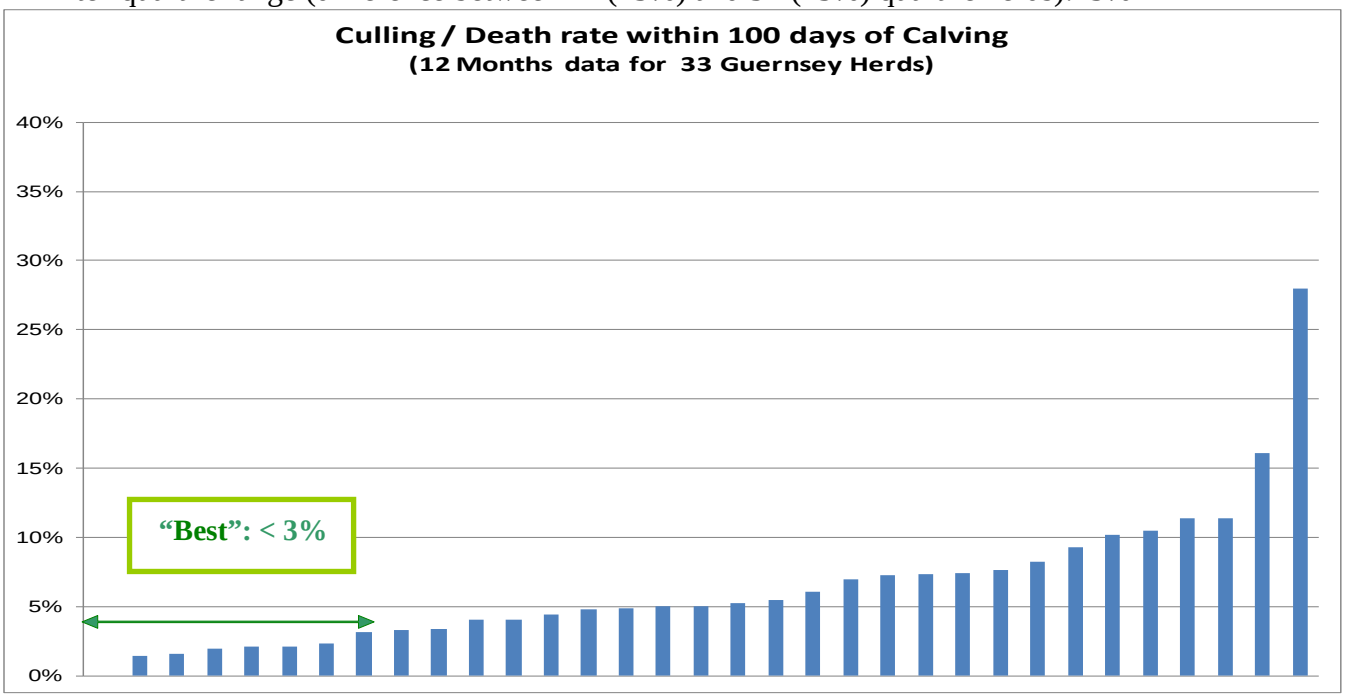
B. Culling / deaths in first 100 days of lactation: What was the culling % during the first 100 days of lactations during the last 12 months. Indicates the level of "involuntary culls" as cows should be at their most productive/profitable periods.

Target (level achieved or surpassed by 25% of herds): 3%

Median (level achieved by the middle herd): 5%

75% level (level achieved or surpassed by 75% of herds): 8%

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 5%



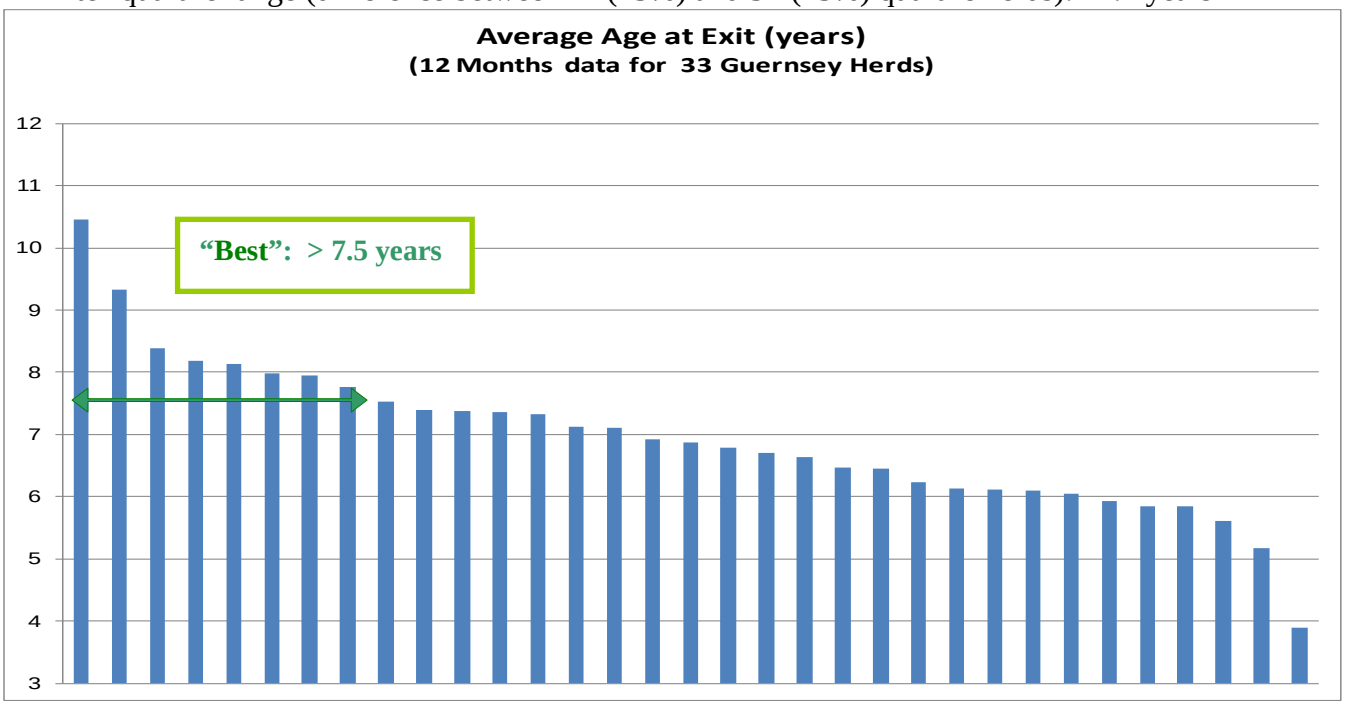
C. Average Age (in years) at exit: What was the average age of cows leaving the herd in the last 12 month at the time of exit. A measure of longevity.

Target (level achieved or surpassed by 25% of herds): 7.5 years

Median (level achieved by the middle herd): 6.9 years

75% level (level achieved or surpassed by 75% of herds): 6.1 years

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 1.4 years



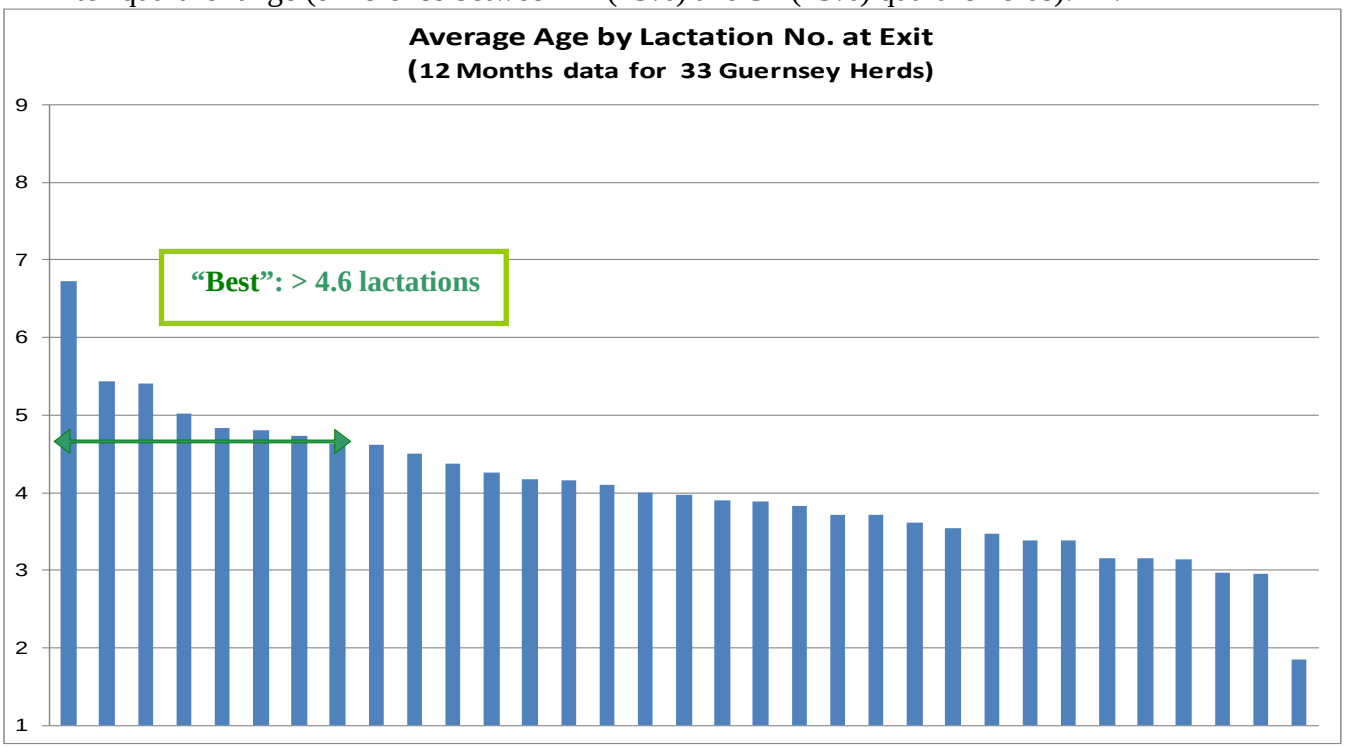
D. Average Age at exit by lactations: What was the average lactation number of cows leaving the herd in the last 12 months. A measure of longevity.

Target (level achieved or surpassed by 25% of herds): 4.6

Median (level achieved by the middle herd): 4.0

75% level (level achieved or surpassed by 75% of herds): 3.5

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 1.1



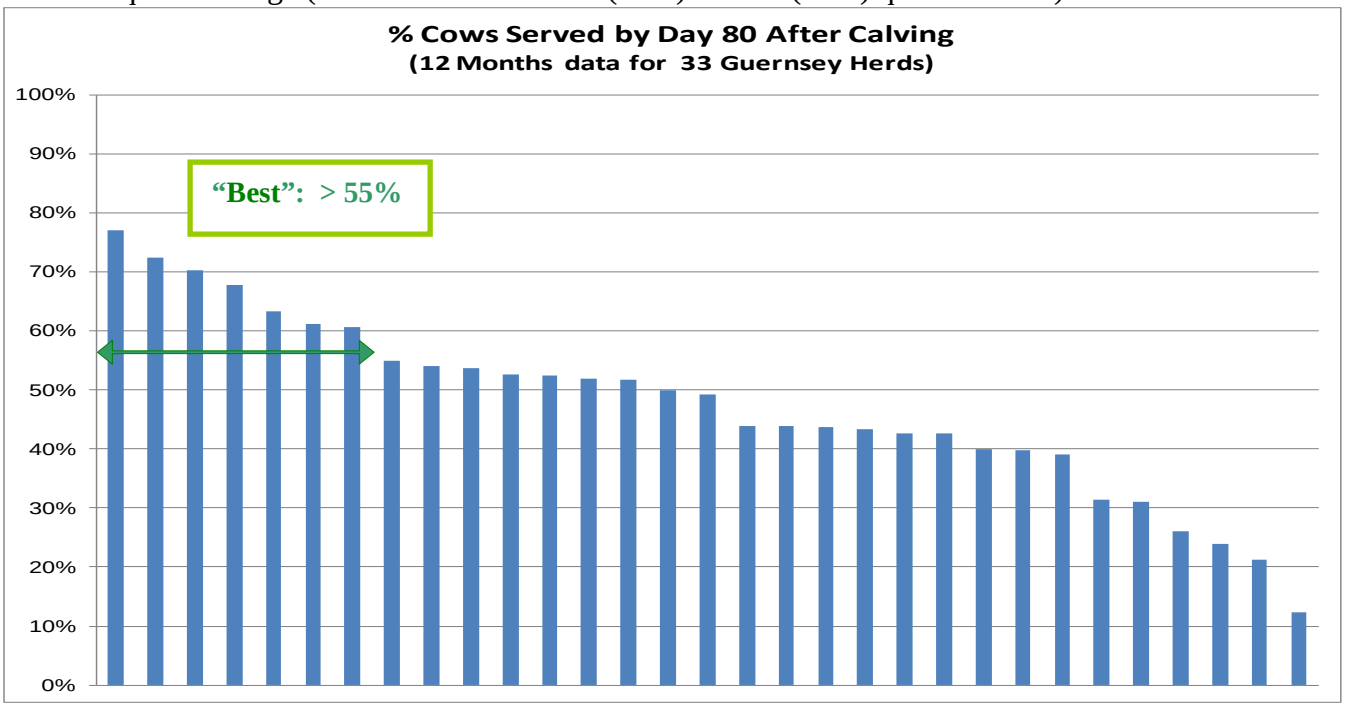
E. Served by day 80: What percentage of calving cows had been served at least once within 80 days of calving.

Target (level achieved or surpassed by 25% of herds): 55%

Median (level achieved by the middle herd): 49%

75% level (level achieved or surpassed by 75% of herds): 40%

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 15%



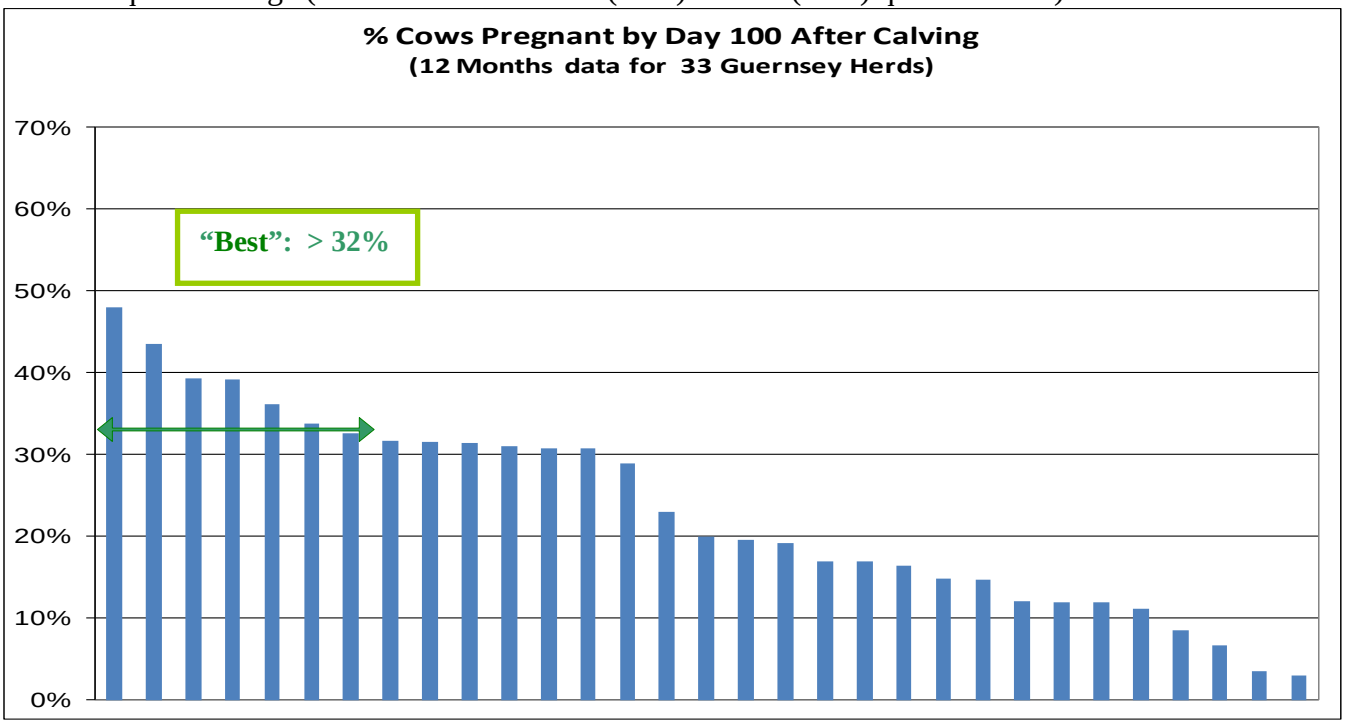
F. Percentage conceived 100 days after calving: What percentage of calving cows had conceived within 100 days of calving.

Target (level achieved or surpassed by 25% of herds): 32%

Median (level achieved by the middle herd): 20%

75% level (level achieved or surpassed by 75% of herds): 13%

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 19%



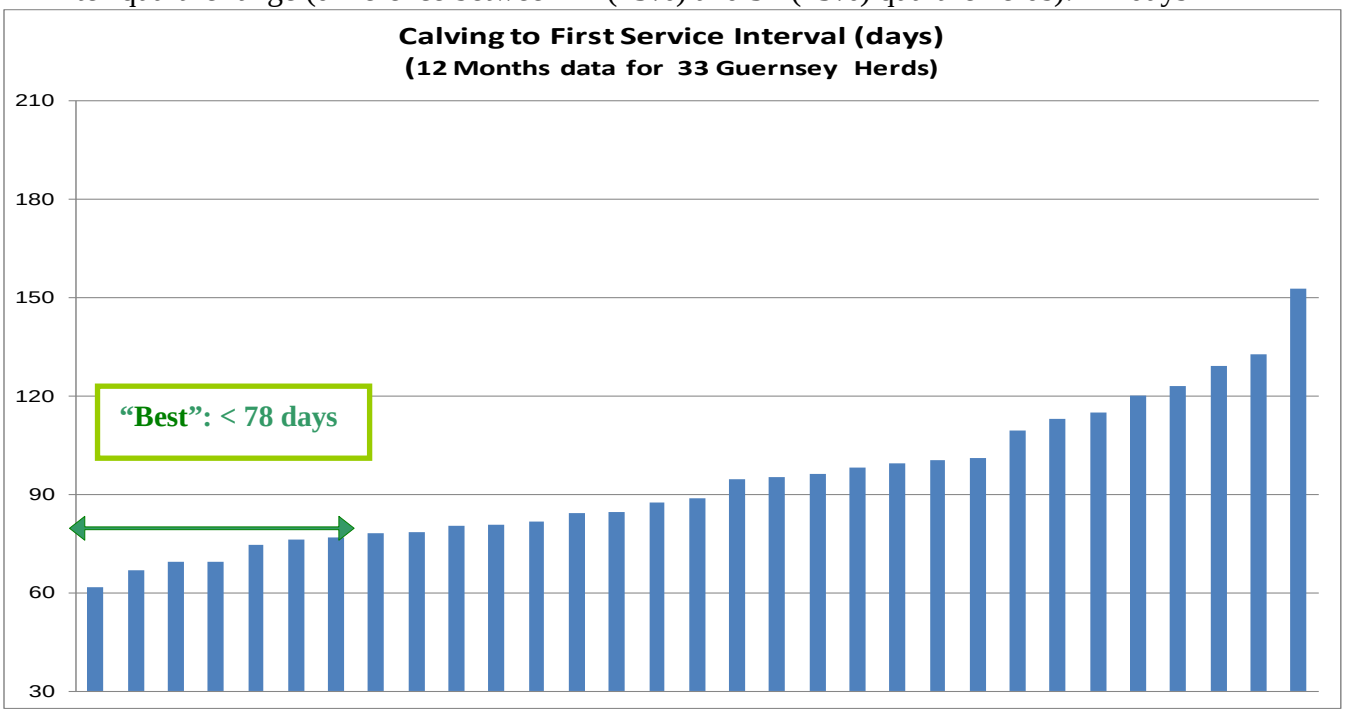
G. Calving to 1st service interval: What was the average interval between calving and 1st service (in days).

Target (level achieved or surpassed by 25% of herds): 78 days

Median (level achieved by the middle herd): 89 days

75% level (level achieved or surpassed by 75% of herds): 105 days

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 27 days



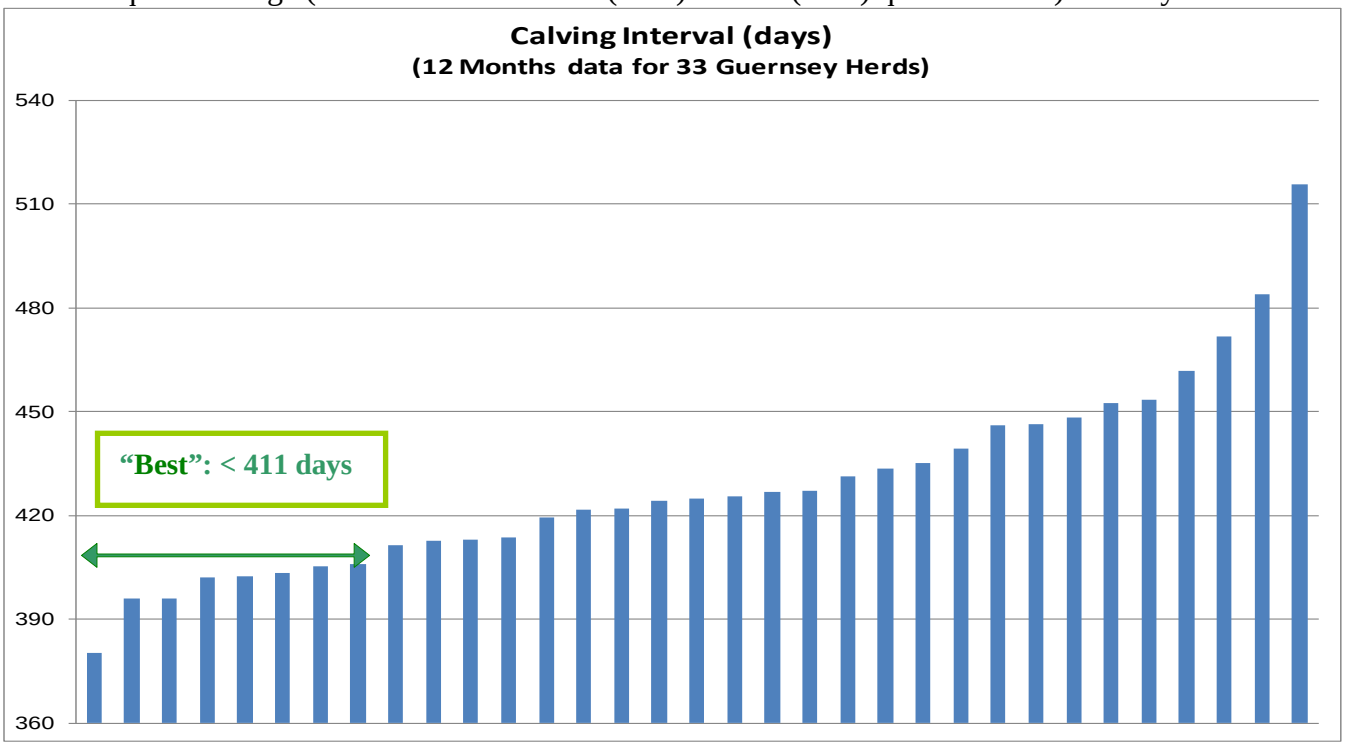
H. Calving interval: What was the average interval between consecutive calvings (in days).

Target (level achieved or surpassed by 25% of herds): 411 days

Median (level achieved by the middle herd): 425 days

75% level (level achieved or surpassed by 75% of herds): 446 days

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 35 days



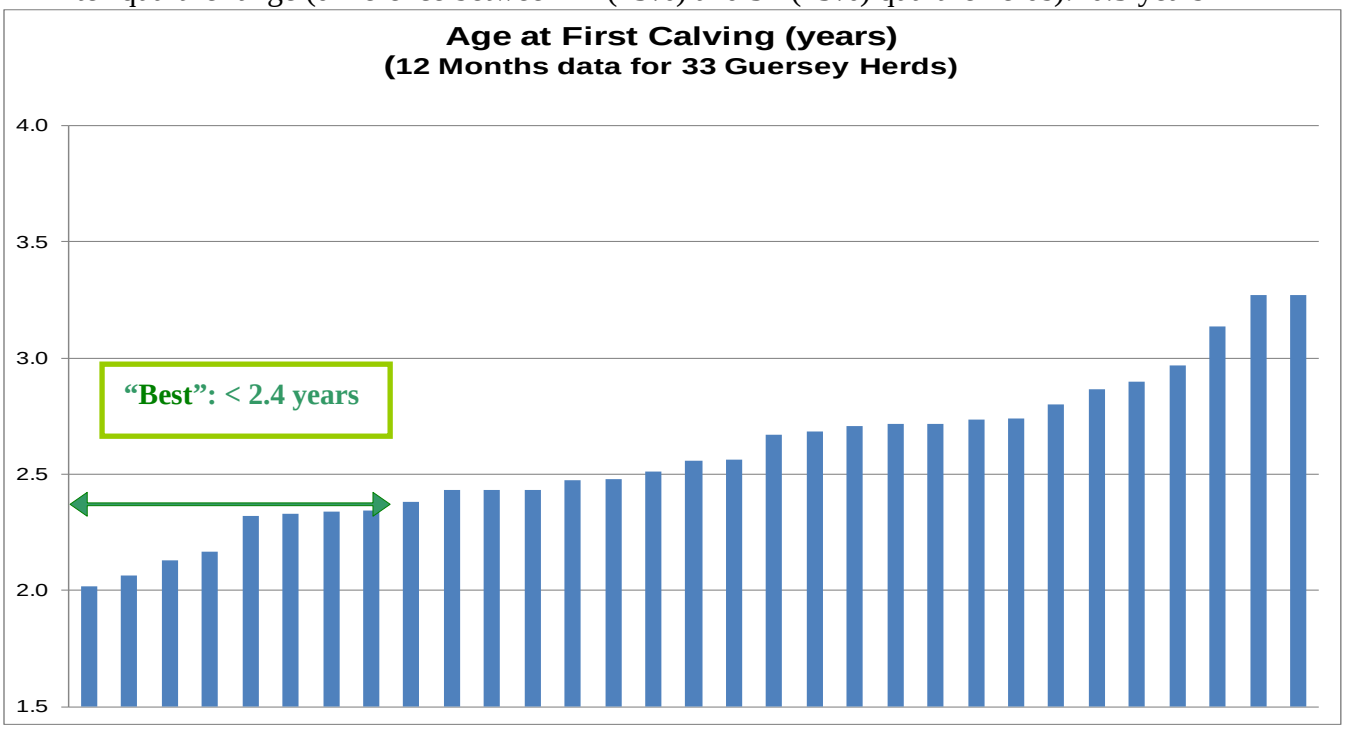
I. Age at 1st calving: What was the average age of heifers calving down (in years) over the last year.

Target (level achieved or surpassed by 25% of herds): 2.4 years

Median (level achieved by the middle herd): 2.6 years

75% level (level achieved or surpassed by 75% of herds): 2.7 years

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 0.3 years



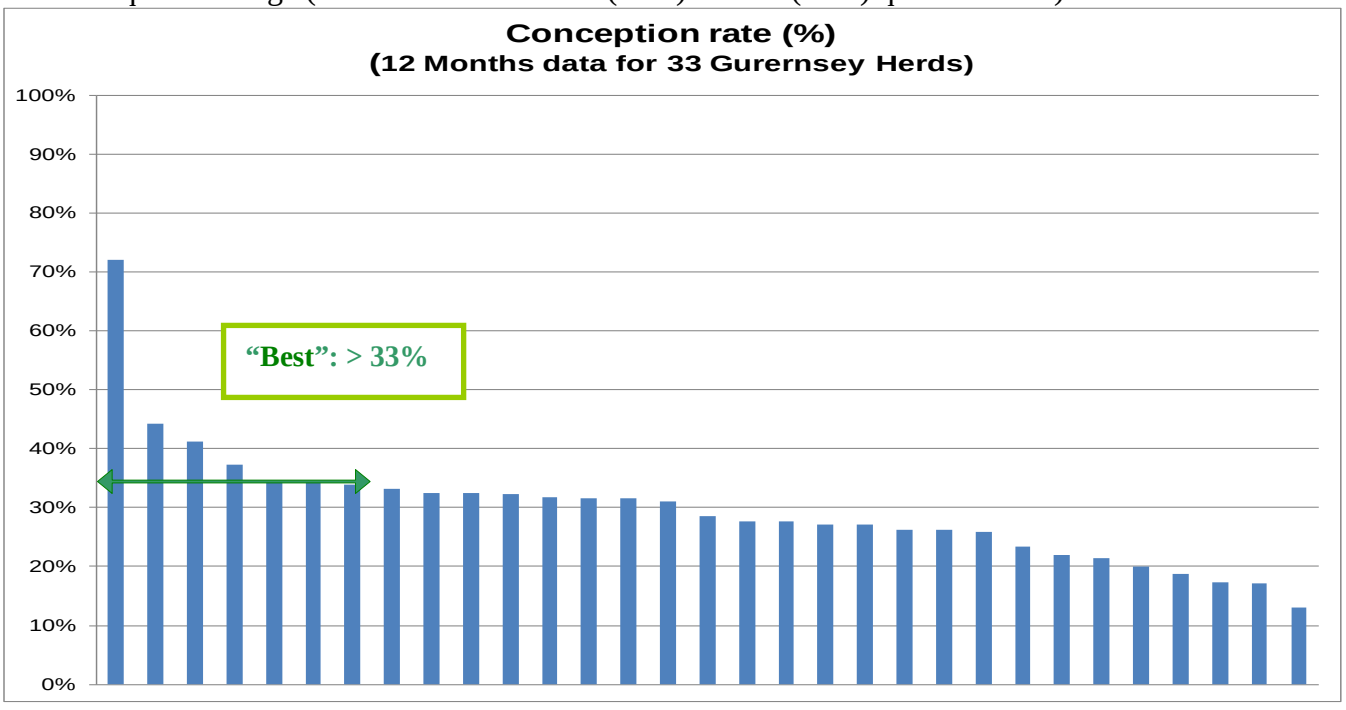
J. Conception rate: What was the average conception rate for services in the last 12 months.

Target (level achieved or surpassed by 25% of herds): 33%

Median (level achieved by the middle herd): 29%

75% level (level achieved or surpassed by 75% of herds): 25%

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 8%



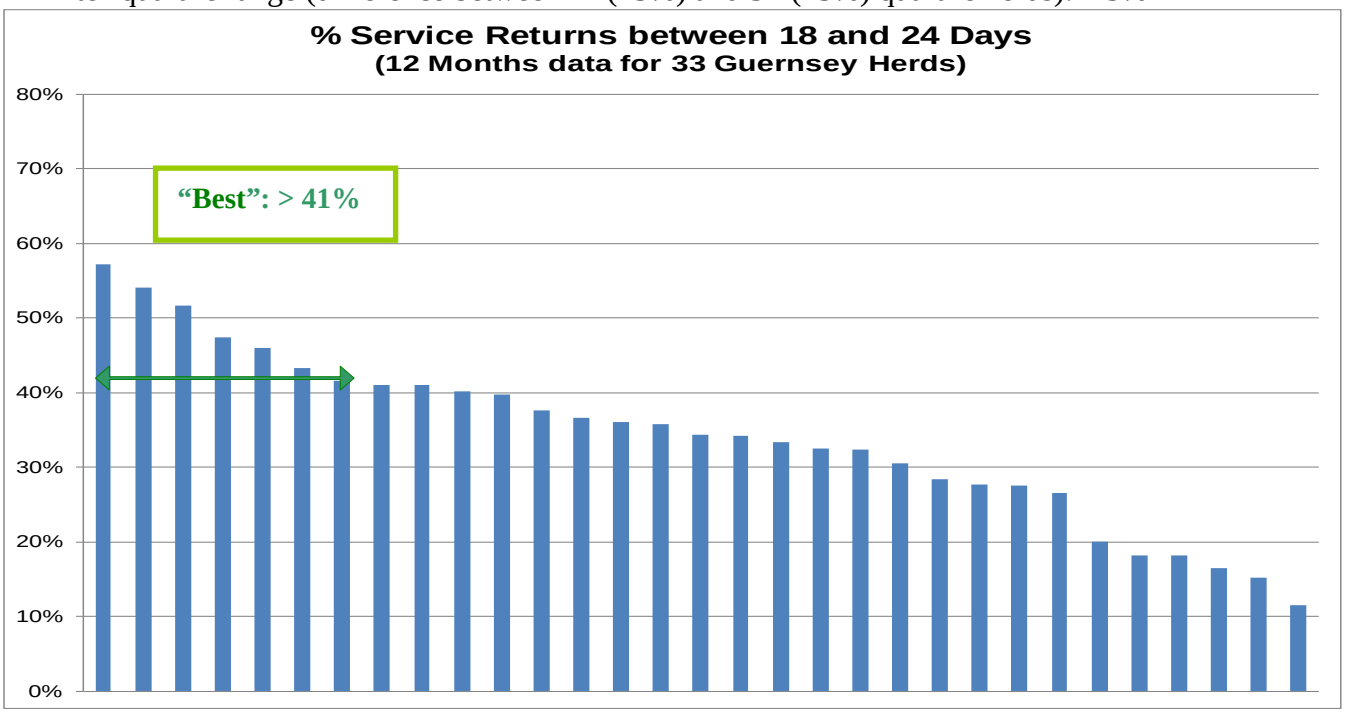
K. Percentage service intervals at 18-24 days: When cows were "re-served", what % of those repeat services happened 18-24 days (one oestrus cycle) after the previous service.

Target (level achieved or surpassed by 25% of herds): 41%

Median (level achieved by the middle herd): 34%

75% level (level achieved or surpassed by 75% of herds): 28%

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 13%



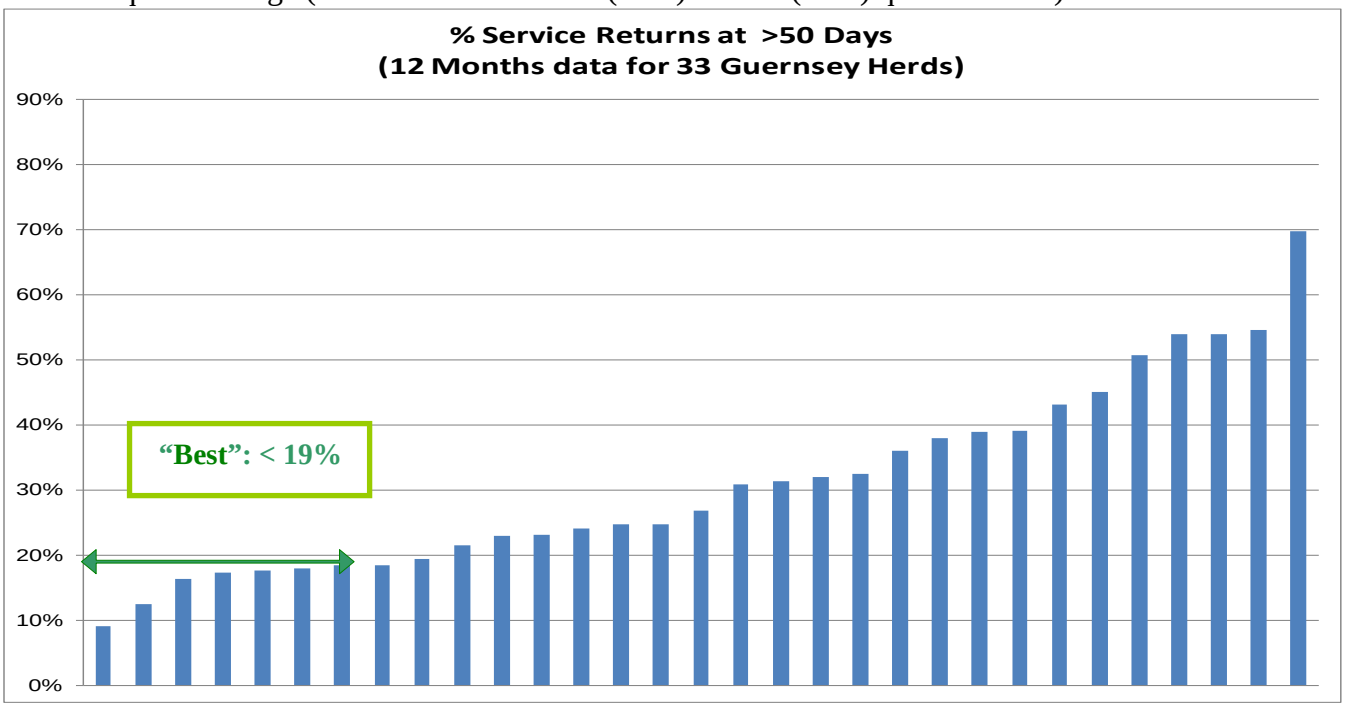
L. Percentage service intervals >50 days: When cows were "re-served", what % of those repeat services happened more than 50 days after the previous service.

Target (level achieved or surpassed by 25% of herds): 19%

Median (level achieved by the middle herd): 27%

75% level (level achieved or surpassed by 75% of herds): 39%

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 20%



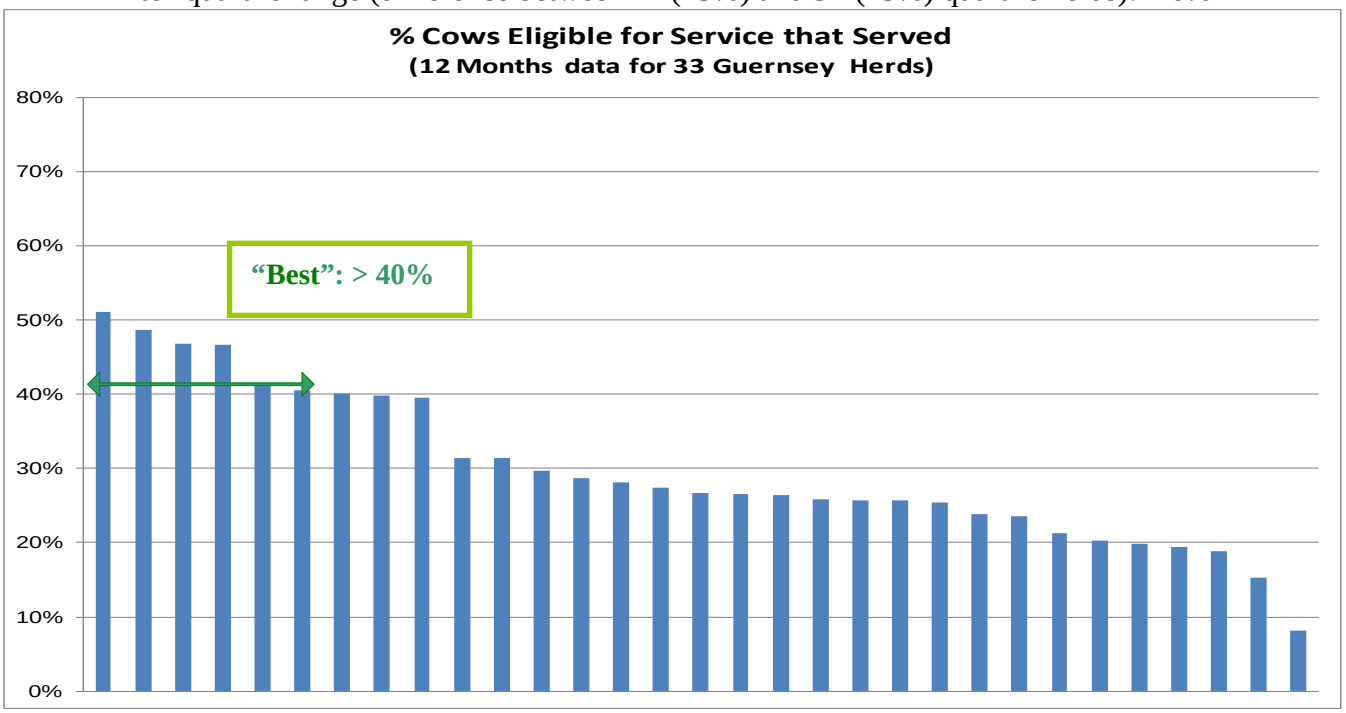
M. Percentage of cows eligible for service that were served: What is the percentage of cows that were eligible for service were served.

Target (level achieved or surpassed by 25% of herds): 40%

Median (level achieved by the middle herd): 27%

75% level (level achieved or surpassed by 75% of herds): 24%

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 16%



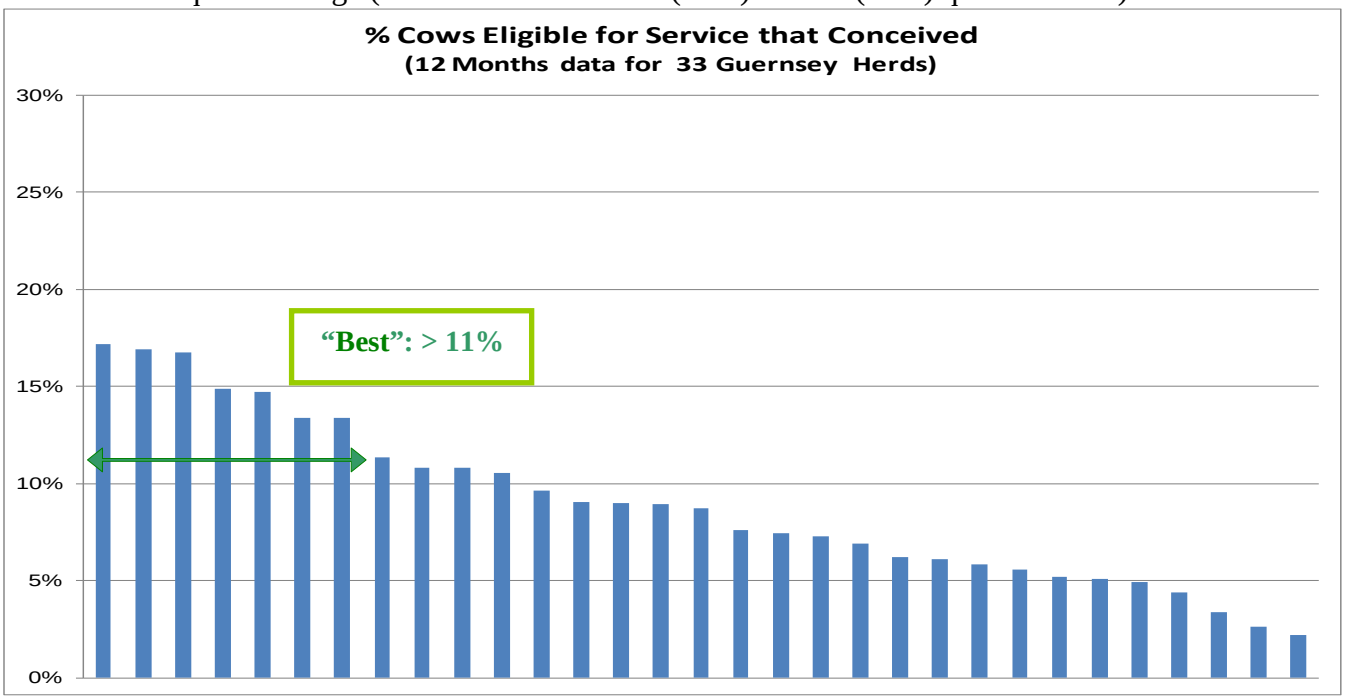
N. Percentage eligible for service that conceived: What is the percentage of cows that were eligible for service that had conceived.

Target (level achieved or surpassed by 25% of herds): 11%

Median (level achieved by the middle herd): 9%

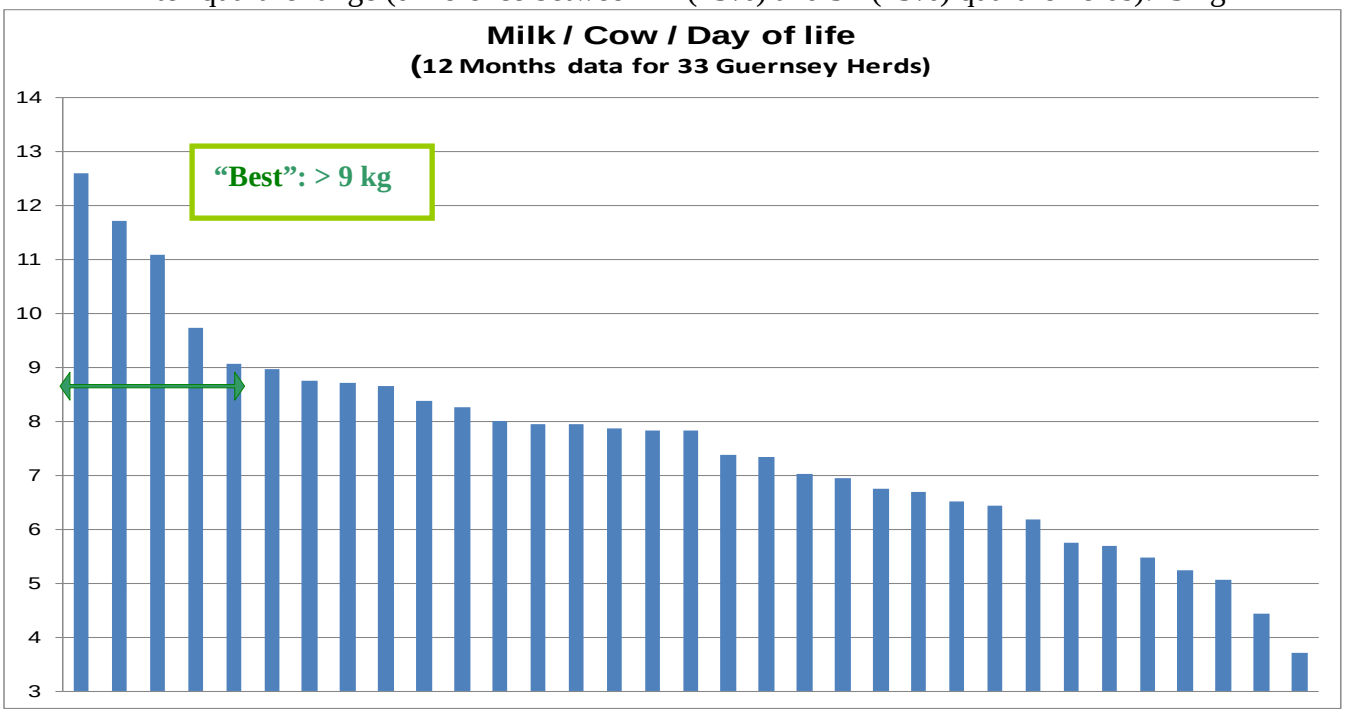
75% level (level achieved or surpassed by 75% of herds): 6%

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 5%



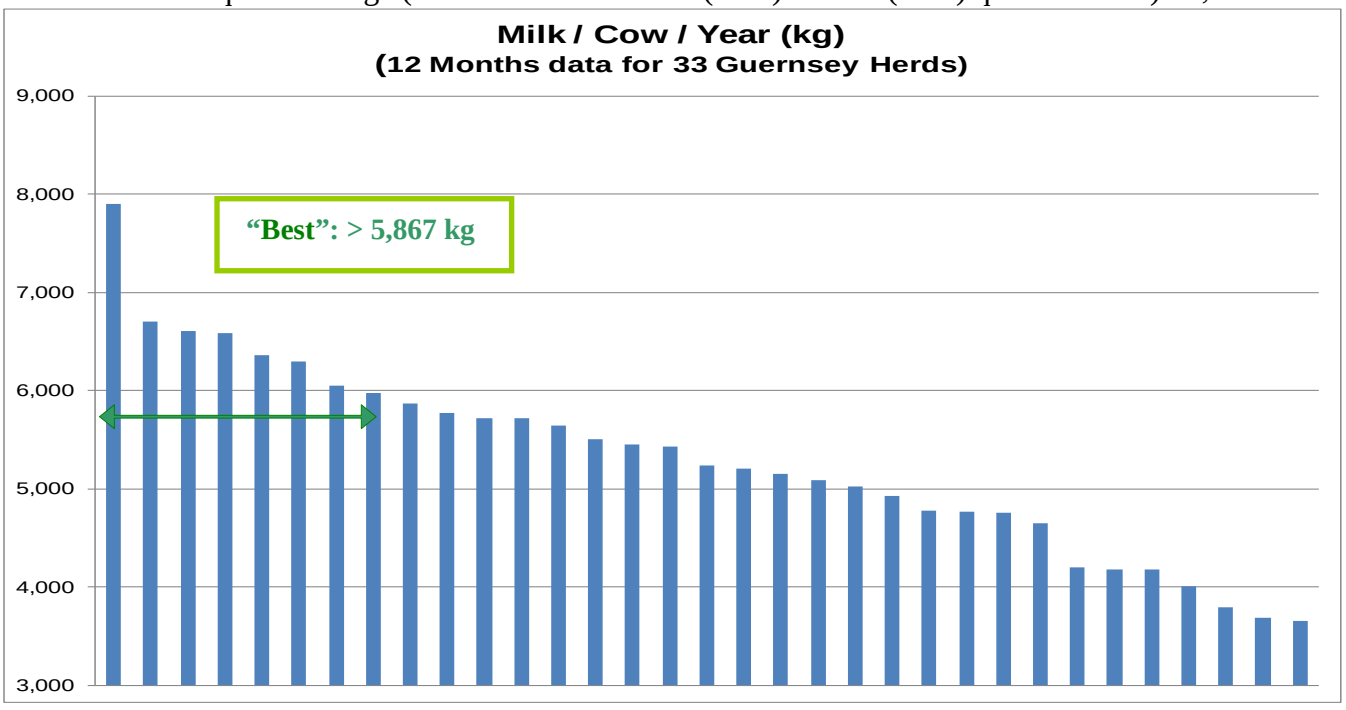
O. Lifetime milk / cow / day (kg): What was the average daily milk yield of cows in their lifetime (including unproductive periods: time as a heifer, dry period).

Target (level achieved or surpassed by 25% of herds): 9 kg
Median (level achieved by the middle herd): 8 kg
75% level (level achieved or surpassed by 75% of herds): 6 kg
Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 3 kg



P. Milk / cow / year (kg): What was the average annual milk yield of all milking cows in the specified year. Average yield per milking cow in 365 days.

Target (level achieved or surpassed by 25% of herds): 5,867 kg
Median (level achieved by the middle herd): 5,235 kg
75% level (level achieved or surpassed by 75% of herds): 4,757 kg
Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 1,110



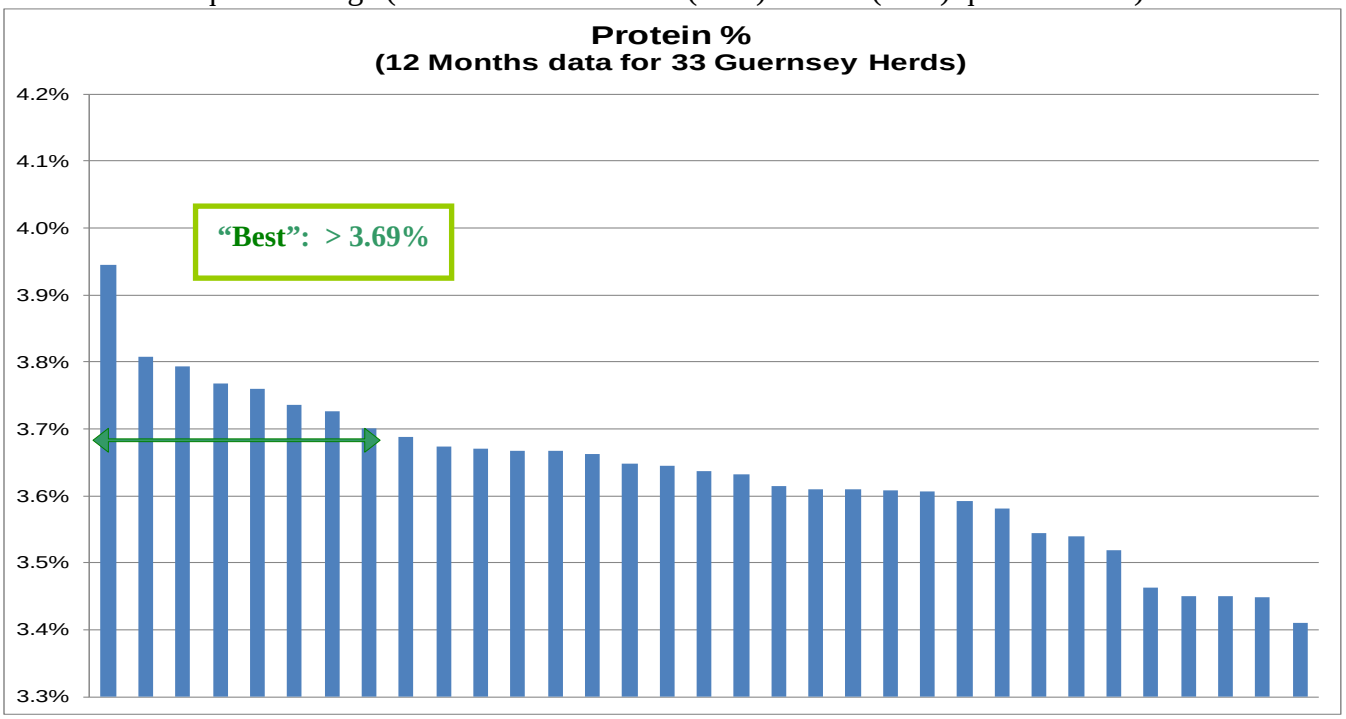
Q. Average protein%: What was the average % protein of all milk samples taken over the year.

Target (level achieved or surpassed by 25% of herds): 3.69%

Median (level achieved by the middle herd): 3.64%

75% level (level achieved or surpassed by 75% of herds): 3.58%

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 0.11%



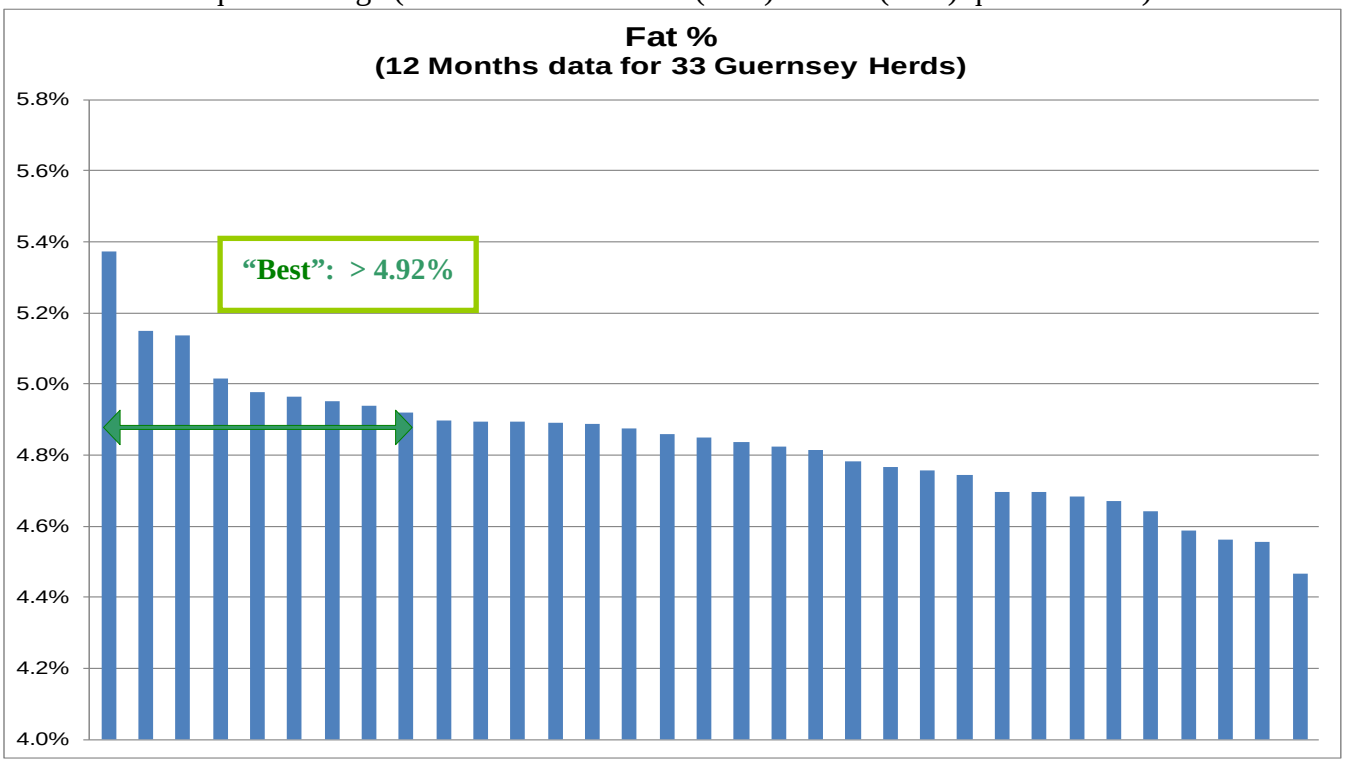
R. Average fat%: What was the average % fat of all milk samples taken over the year.

Target (level achieved or surpassed by 25% of herds): 4.92%

Median (level achieved by the middle herd): 4.85%

75% level (level achieved or surpassed by 75% of herds): 4.70%

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 0.22%



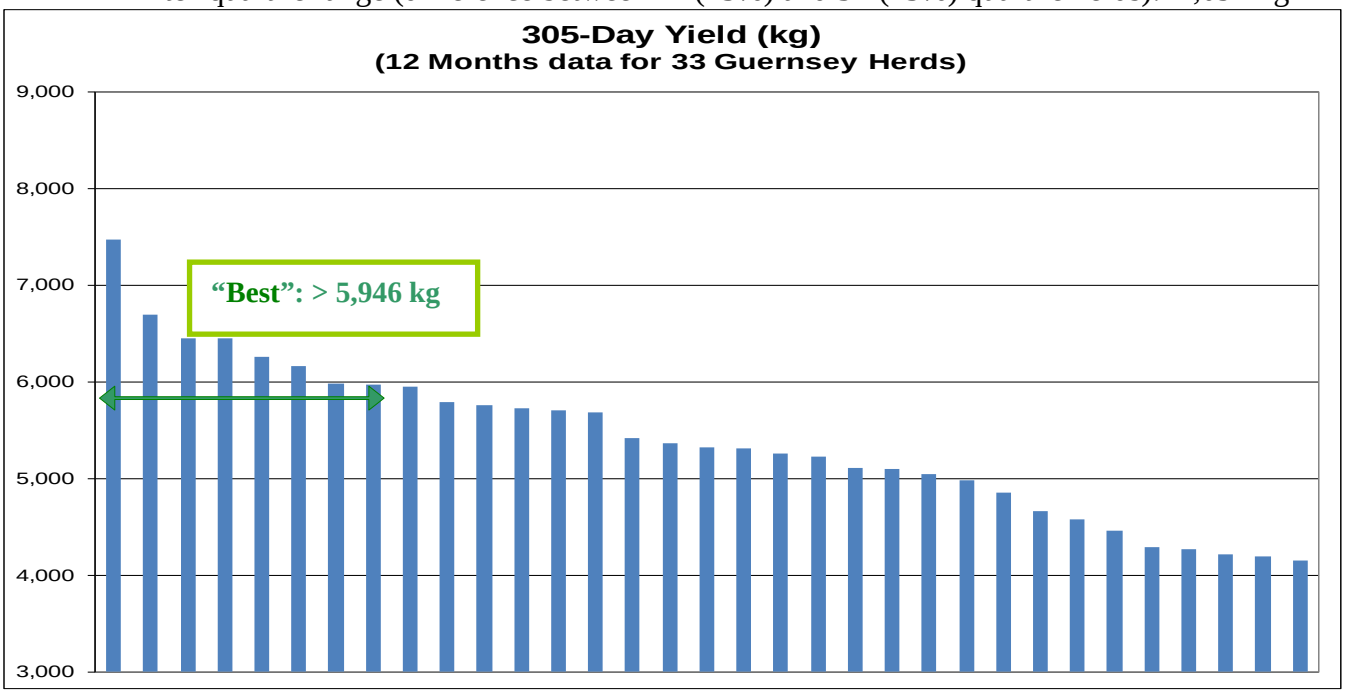
S. 305 day yield (kg): What was the average yield by day 305 of lactation for all cows reaching day 305 during the year.

Target (level achieved or surpassed by 25% of herds): 5,946 kg

Median (level achieved by the middle herd): 5,319 kg

75% level (level achieved or surpassed by 75% of herds): 4,854 kg

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 1,092 kg



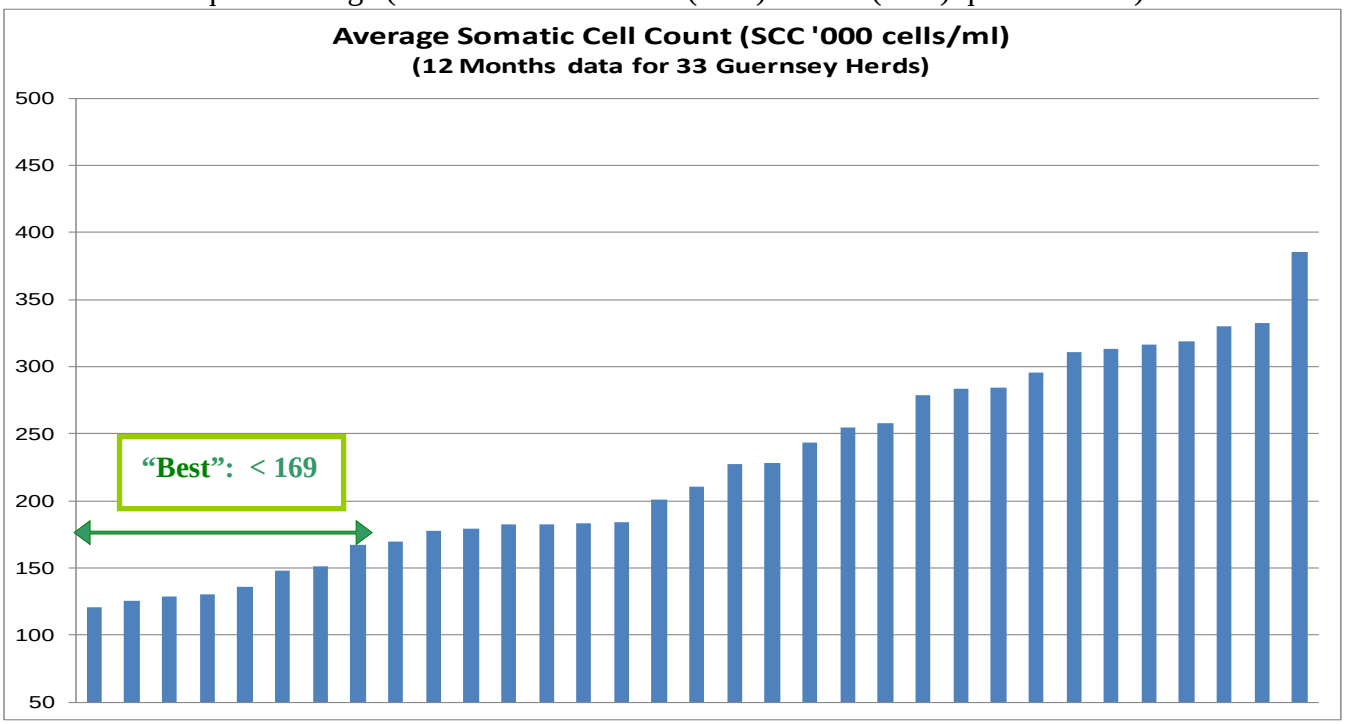
T. Average SCC ('000 cells/ml): What was the average SCC of all the milk samples taken in the last 12 months.

Target (level achieved or surpassed by 25% of herds): 169

Median (level achieved by the middle herd): 211

75% level (level achieved or surpassed by 75% of herds): 285

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 116



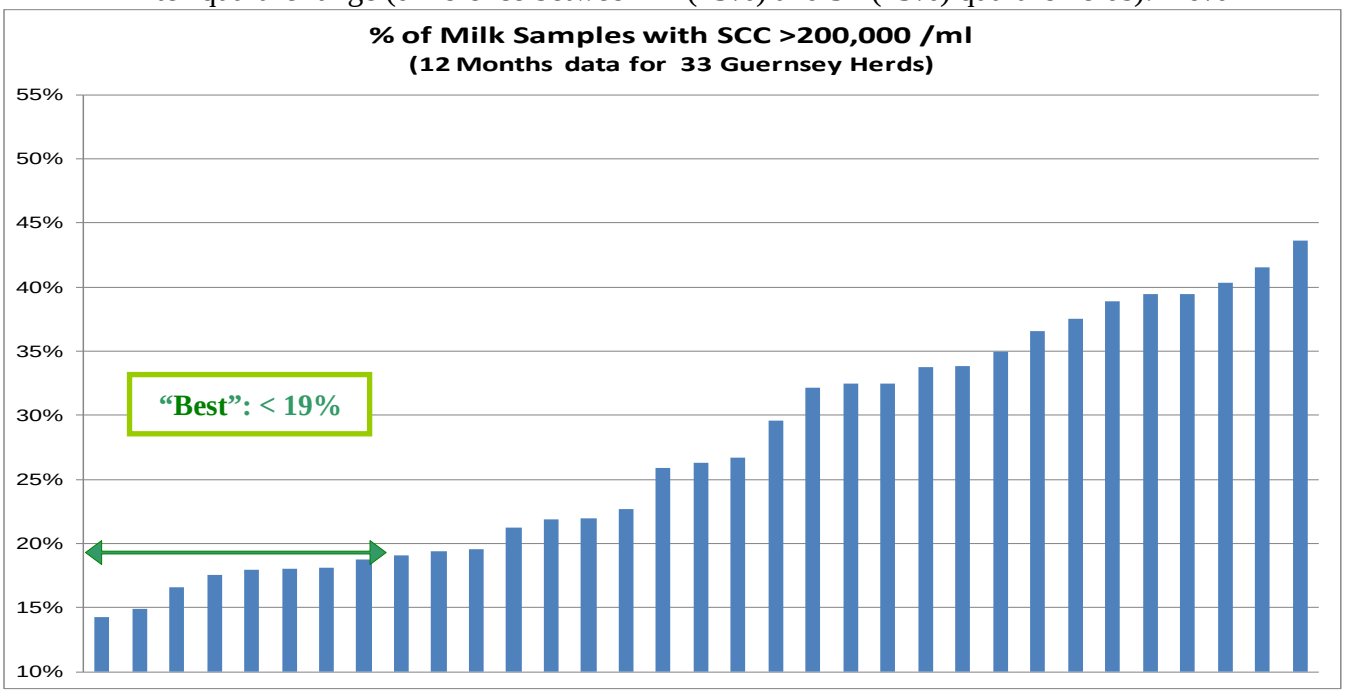
U. Percentage SCC >=200,000 cells/ml: What % of milk samples taken in the last 12 months had a SCC over 200,000 cells/ml milk. Indicates the size of any reservoir of infection.

Target (level achieved or surpassed by 25% of herds): 19%

Median (level achieved by the middle herd): 26%

75% level (level achieved or surpassed by 75% of herds): 35%

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 16%



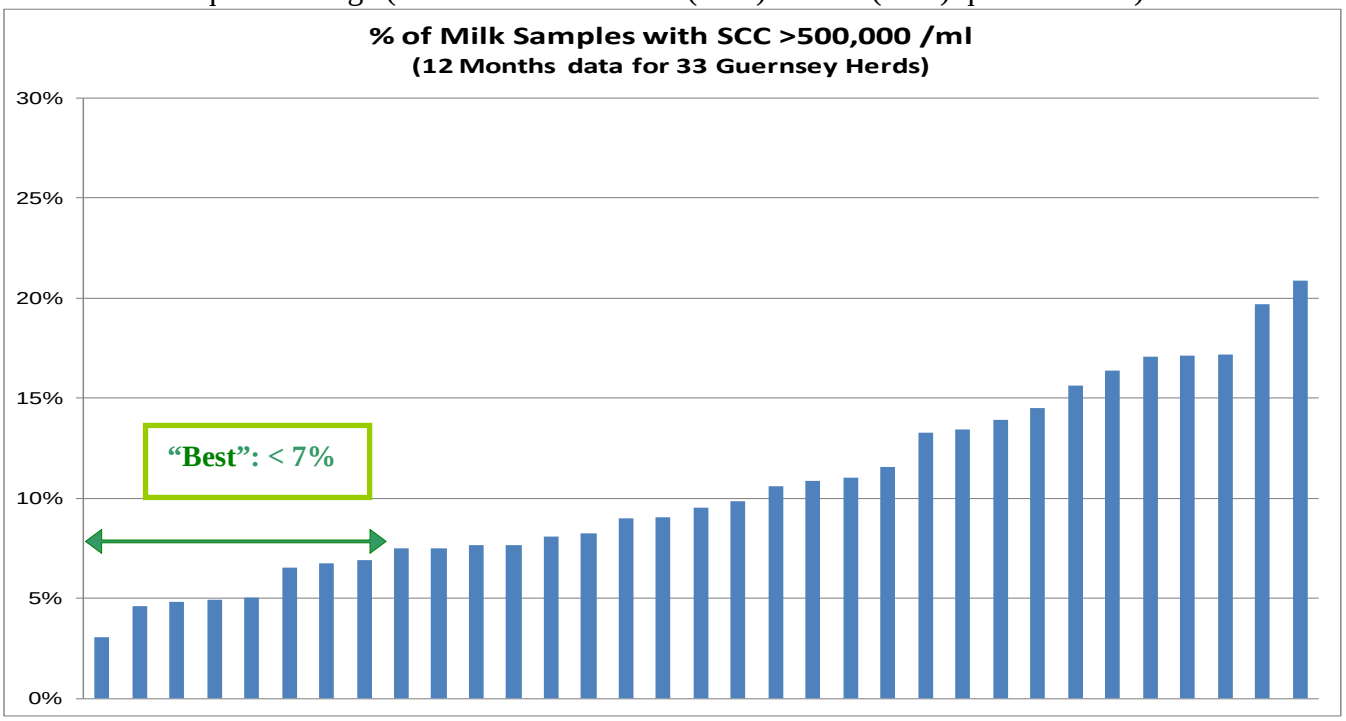
V. Percentage SCC >500,000 cells/ml: What % of milk samples taken in the last 12 months had a SCC over 500,000 cells/ml of milk. How many of the cows are major reservoirs of infection.

Target (level achieved or surpassed by 25% of herds): 7%

Median (level achieved by the middle herd): 10%

75% level (level achieved or surpassed by 75% of herds): 14%

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 7%



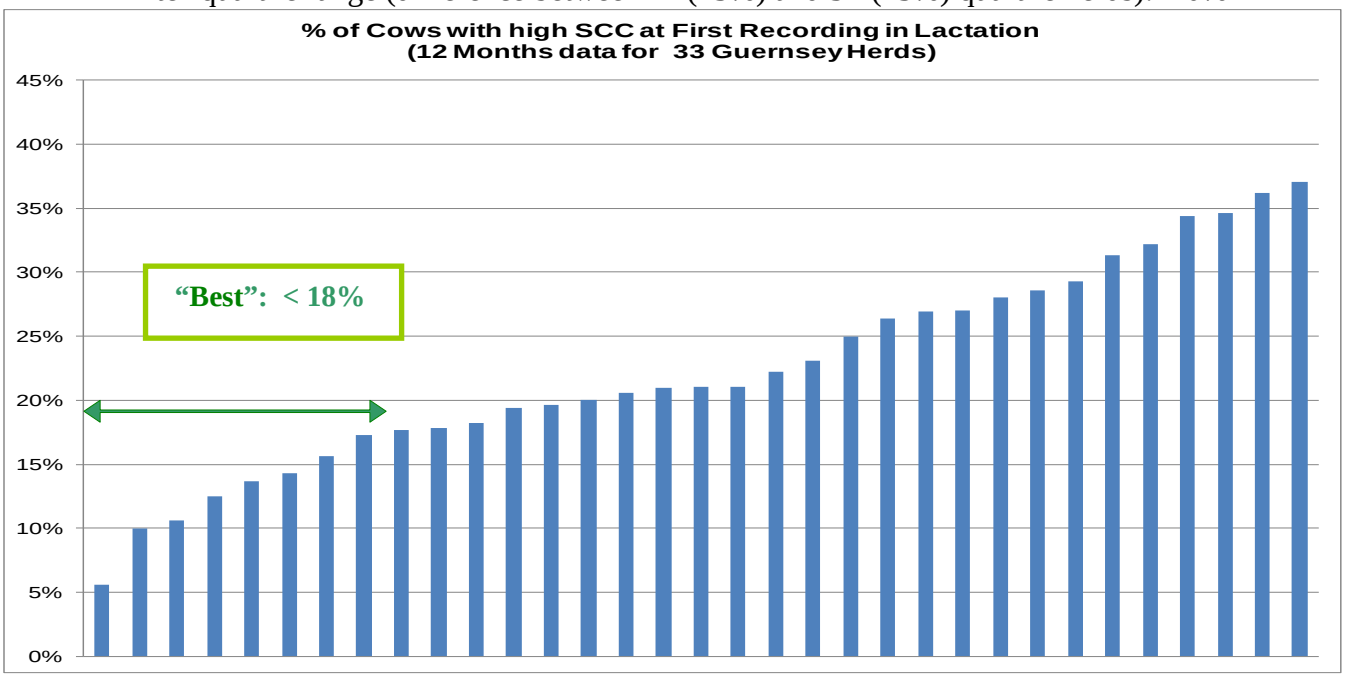
W. Percentage 1st recording SCC >=200,000 cells/ml: What % of cows started new lactations in the last year with a high SCC (>200,000 cells) at the first milk recording.

Target (level achieved or surpassed by 25% of herds): 18%

Median (level achieved by the middle herd): 21%

75% level (level achieved or surpassed by 75% of herds): 28%

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 10%



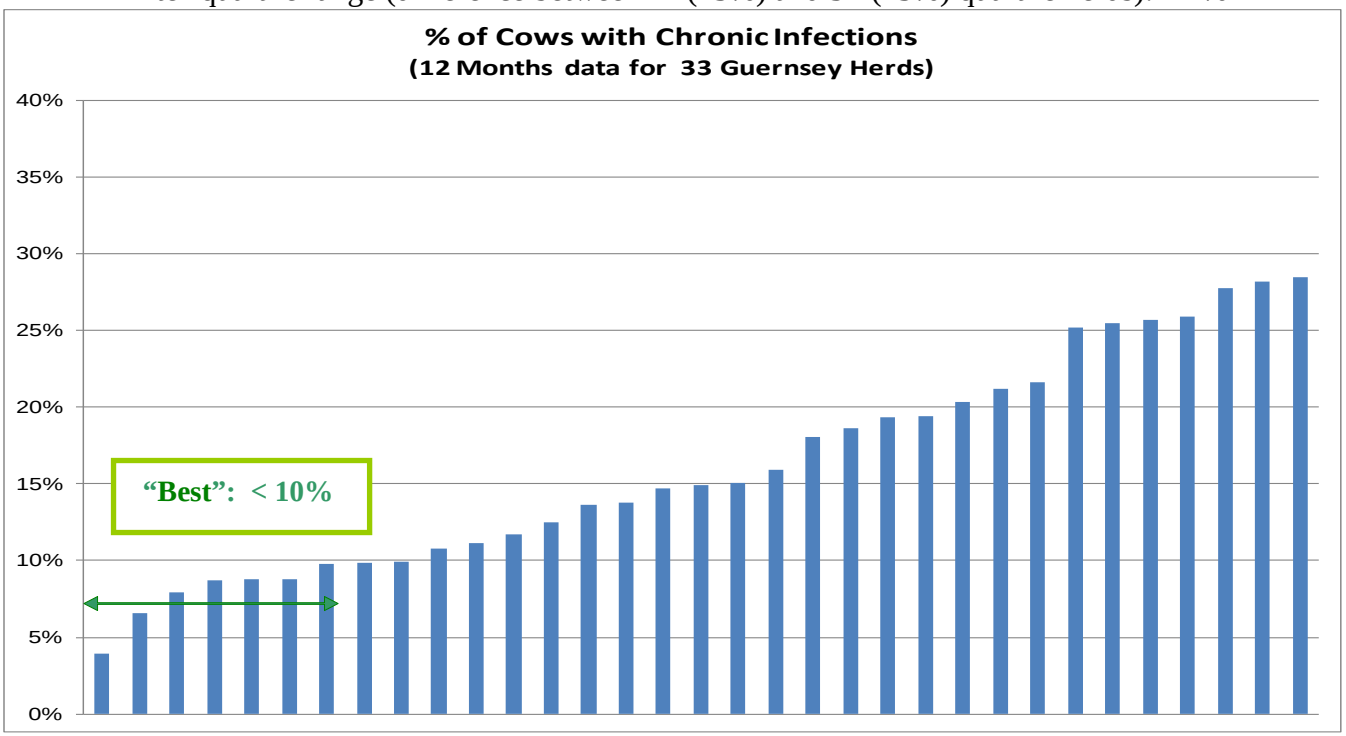
X. Percentage chronic SCC >=200,000 cells/ml: What % of all milk samples taken over the last 12 months that were from CHRONIC cows (cows whose milk was also over 200,000 cells at the PREVIOUS milk recordings).

Target (level achieved or surpassed by 25% of herds): 10%

Median (level achieved by the middle herd): 15%

75% level (level achieved or surpassed by 75% of herds): 21%

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 11%



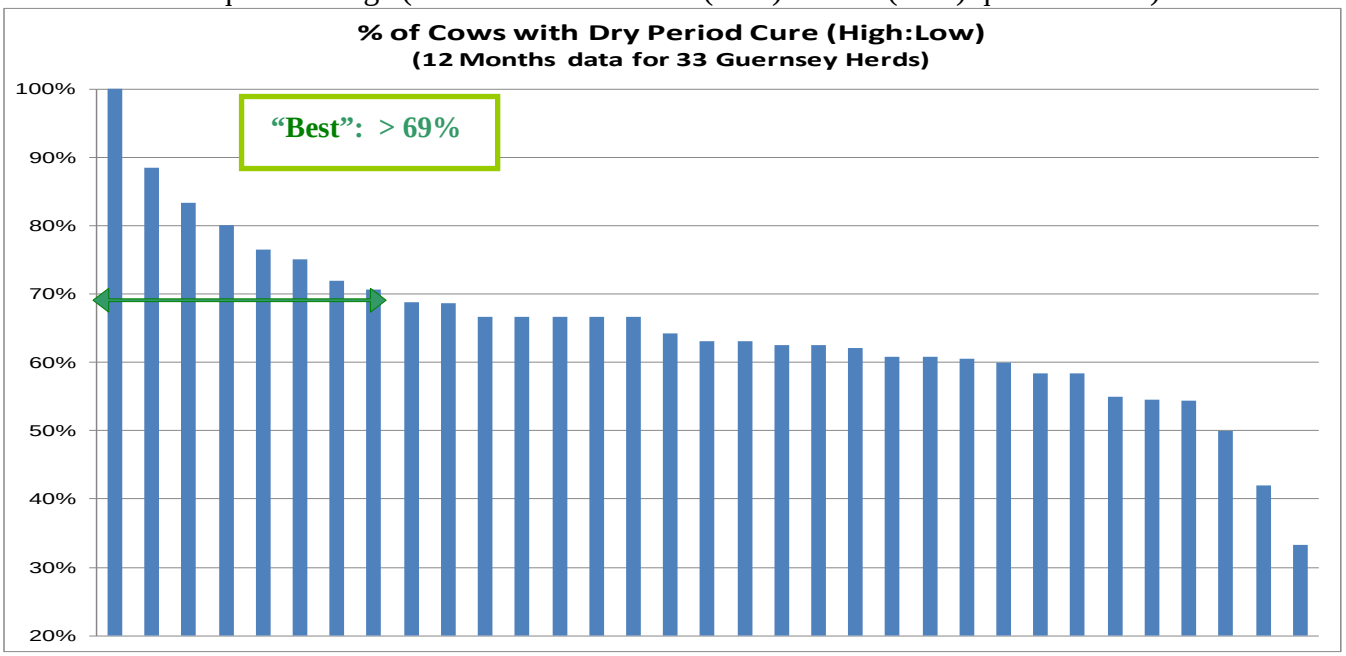
Y. Percentage Dry period cure (High:Low): What % of cows calving in the last year that ended their previous lactation with a high SCC (>200,000 cells), started the new lactation with a LOW cell count (<200,000 cells). The % of high SCC cows "cured" by the dry period.

Target (level achieved or surpassed by 25% of herds): 69%

Median (level achieved by the middle herd): 63%

75% level (level achieved or surpassed by 75% of herds): 60%

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 9%



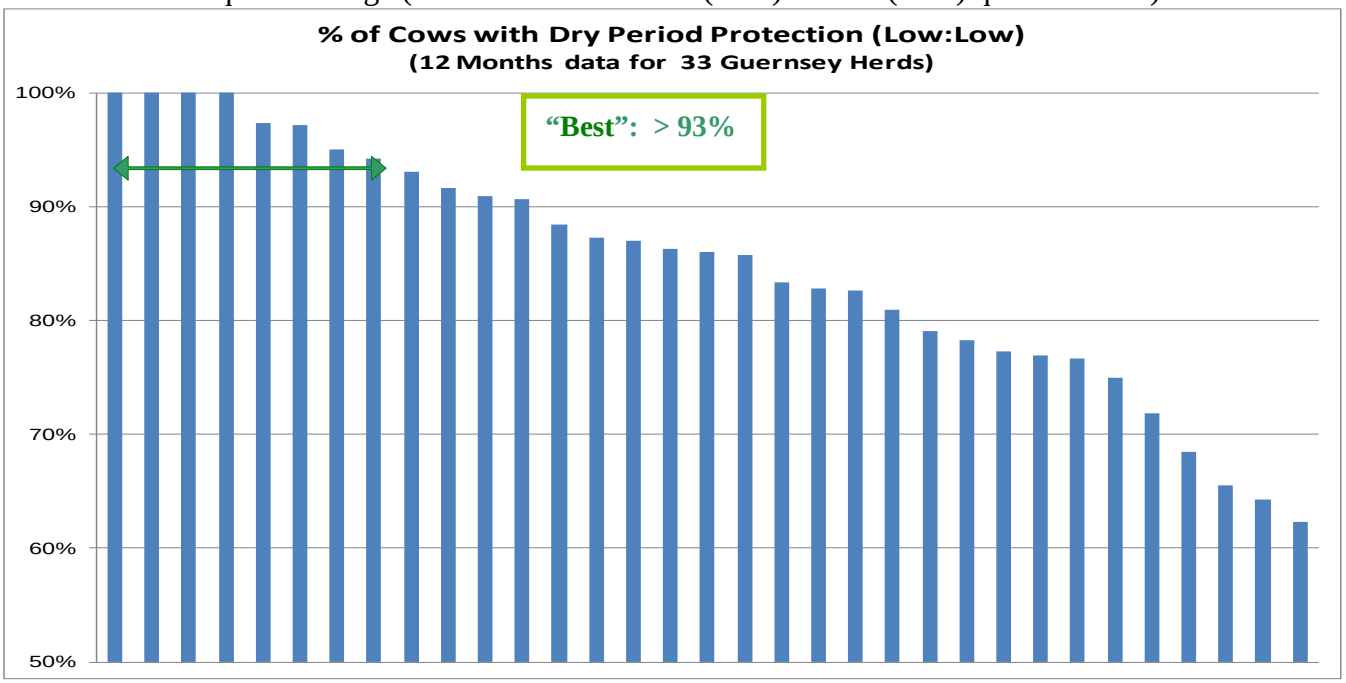
Z. Percentage Dry period protection (Low:Low): What % of cows calving in the last year that ended their previous lactation with a LOW SCC (<200,000 cells), started the new lactation with a LOW cell count (<200,000 cells). The % of low SCC cows "protected" through the dry period.

Target (level achieved or surpassed by 25% of herds): 93%

Median (level achieved by the middle herd): 86%

75% level (level achieved or surpassed by 75% of herds): 77%

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 16%



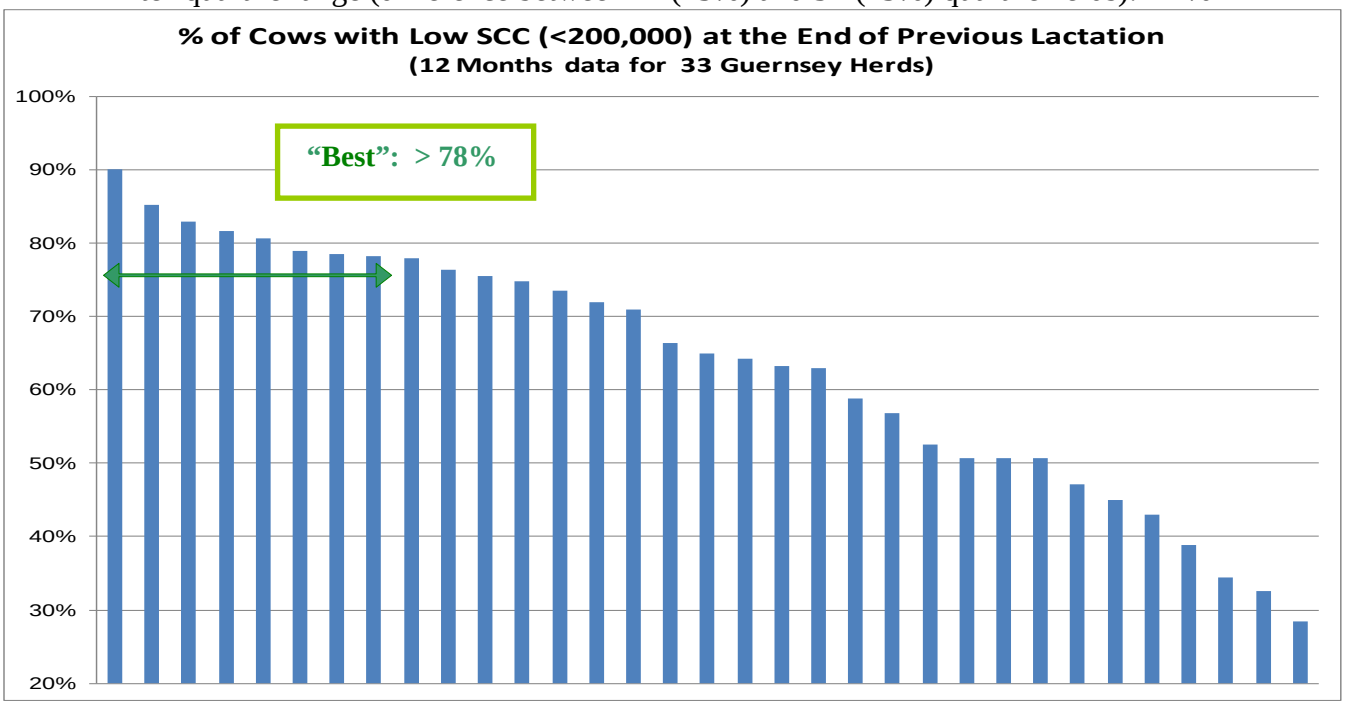
ZA. Percentage Low at the end of previous lactation: What % of cows calving in the last year had ended their previous lactation with a LOW SCC (<200,000 cells).

Target (level achieved or surpassed by 25% of herds): 78%

Median (level achieved by the middle herd): 65%

75% level (level achieved or surpassed by 75% of herds): 51%

Inter-quartile range (difference between 1st (25%) and 3rd (75%) quartile herds): 27%

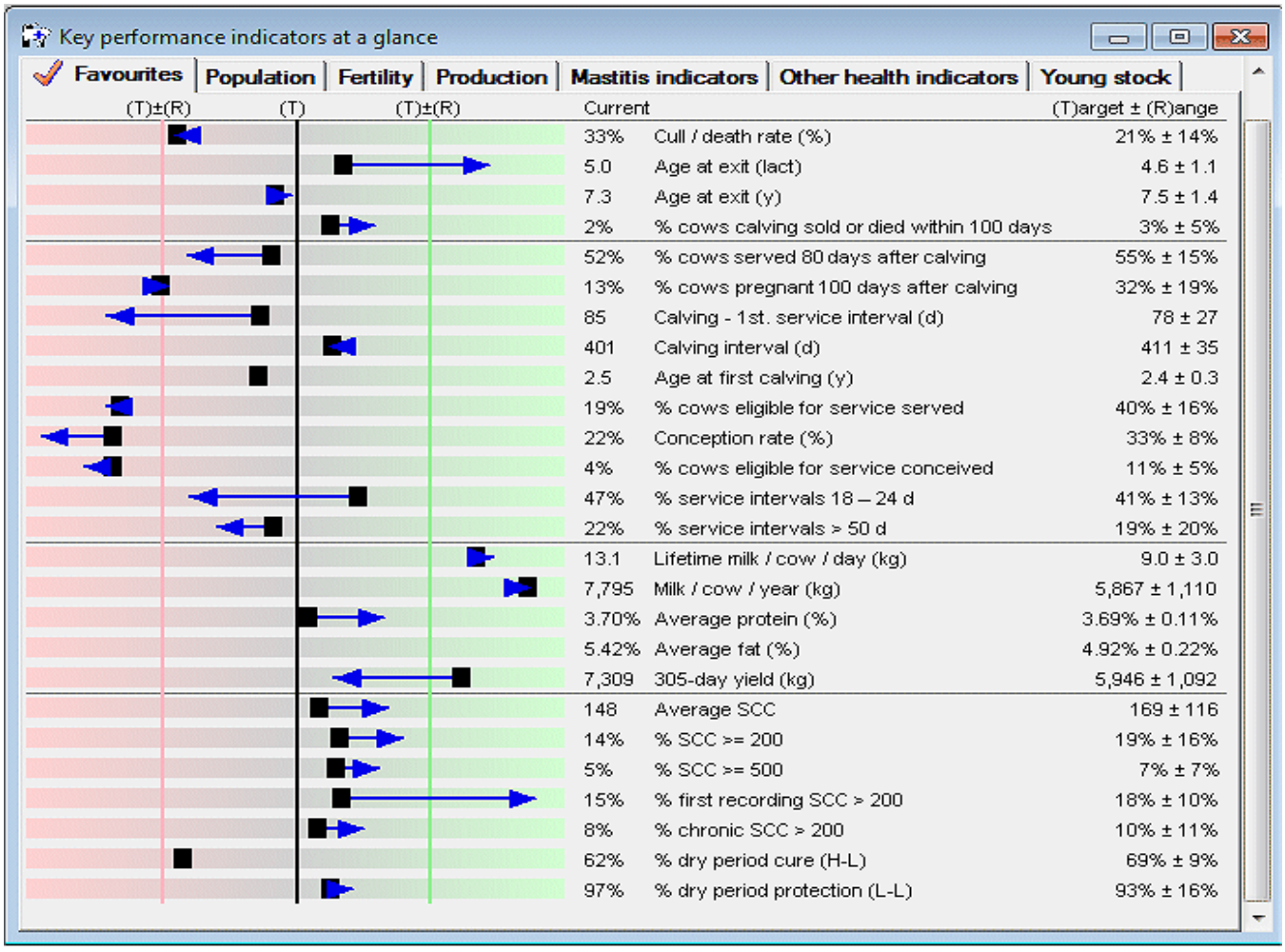


Section 3. The Practical Use of Key Performance Indicators by Farmers and Their Technical Advisers

Using the values obtained from this study it is now possible to compare the performance of individual herds against these "national" standards. The dynamic nature of dairy production requires a broad range of parameters covering fertility, production and health.

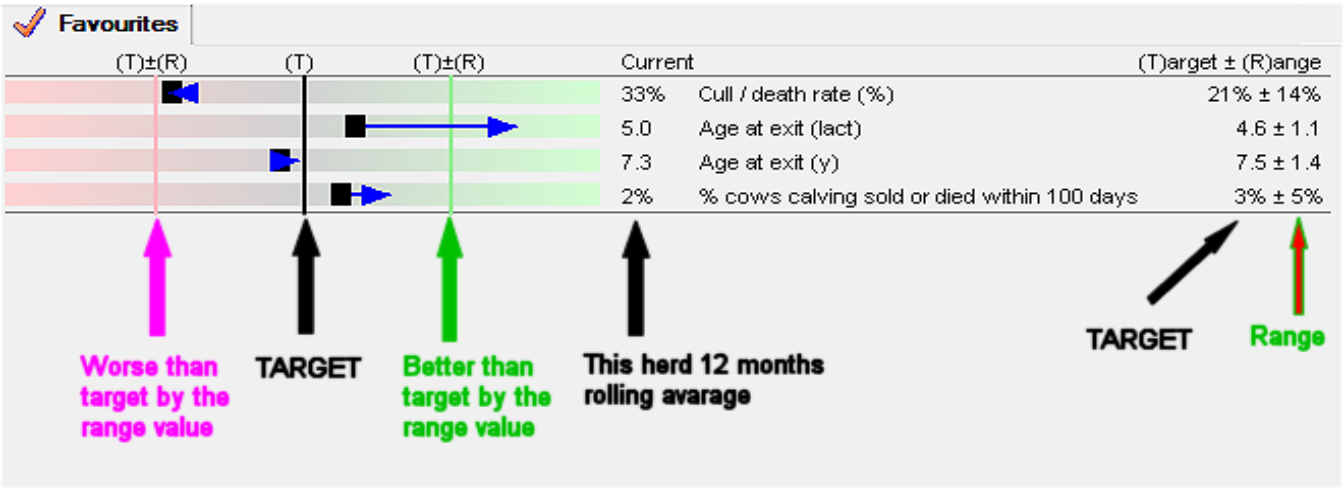
The Key Performance Indicators Report in the InterHerd+ program (Figure 3) provides an overview of one herd's performance. In addition to calculating key performance indicators (12 month rolling averages) for each of the parameters covered by this study, the target and interquartile range values from the study are used to demonstrate where the herd would fall in a comparison with the 33 herds. This highlights the relative strengths and weaknesses of the herd.

Figure 3. The Key Performance Indicator Report of InterHerd+



The meaning of the different lines and values against each key performance indicator are explained in Figure 4. To the right of each listed parameter is a **target** value and a **range** (corresponding to the values given in Table 1)**.** In Figure 4 the TARGET value for cull/death rate is 21% with a range of ±14%.

Figure 4. The KPI Report: The figures explained



The values are also displayed graphically to the left of the parameter titles. The target value is represented by the vertical black line. The area to the right hand side is shaded green to denote a performance level that is better than the target value. The vertical green line represents "Better than target by the range".

To the left of the target line is shaded red denoting performance that is worse than the target value. The vertical line represents "Worse than the target by the range".

So in Figure 4 where a lower culling rate is preferable, the green vertical line represents the target (21%) better by the range (14) = a culling rate of 7%. In contrast the red vertical line represents the target worse by the range = a culling rate of 35%.

The positions of the black square and blue arrow  show how the current herd is performing for each parameter relative to the specified target and range values. The arrow indicates the direction of change.

- The **black square** is the average value the herd achieved in that parameter over the last **12 months**. So it is the longer-term position of the herd (the value displayed to the left of the parameter title).
- The **blue** arrow head is the herd's average value over the last **3 months**, so the recent performance. The line and arrow show the difference and direction of change between the 3 and 12 month average values. Beware that while this may indicate a significant change in herd performance it may also be influenced by seasonal factors in the 3 month period.

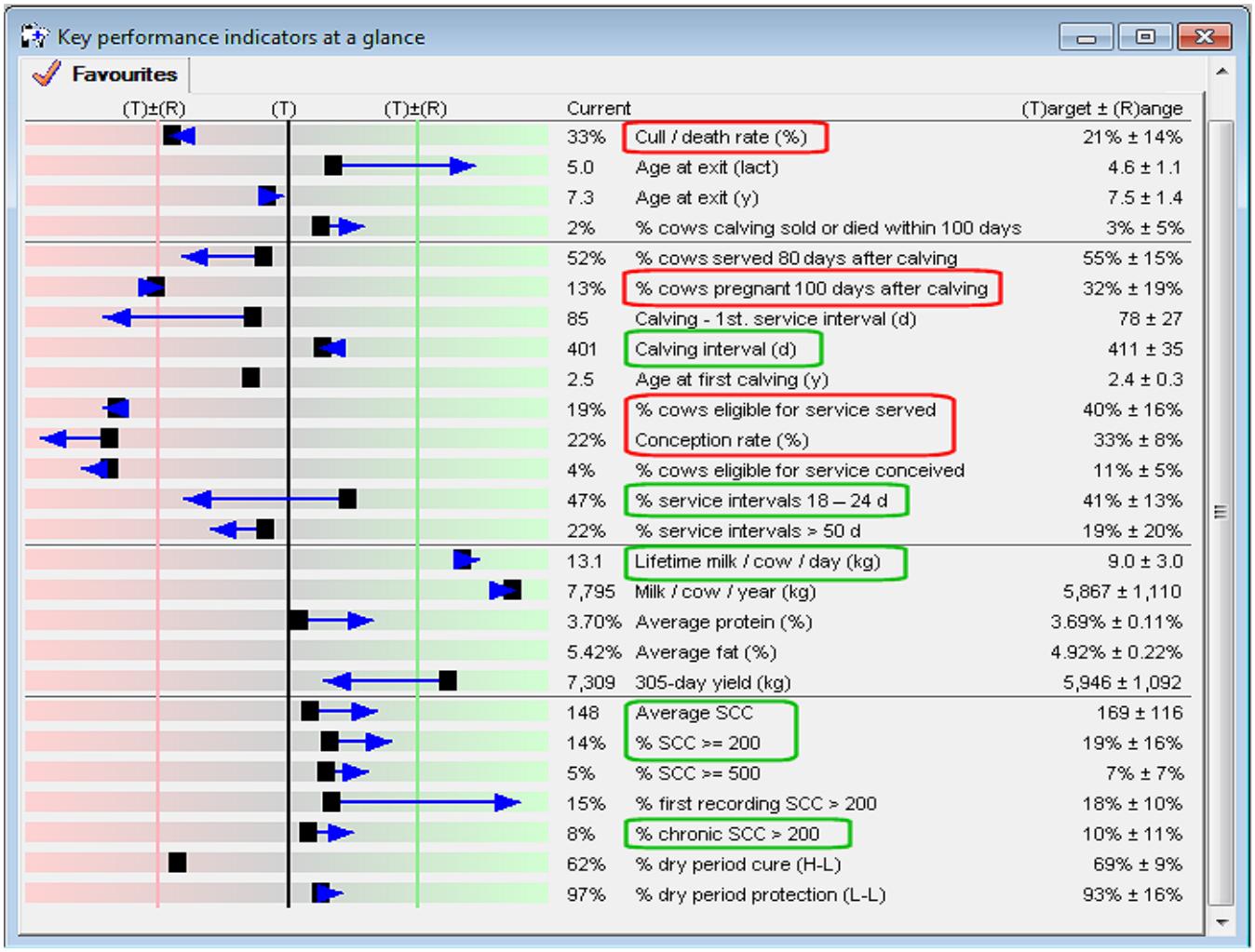
Using the target and range values to highlight a herd's strengths and weaknesses

Herd strengths: This study has set the **TARGET** value to the level achieved by the "BEST" 25% of herds. Thus in the graphic of Figure 5 below, any KPI with a value to the **right (green side) of the black target line** would be "in **the best 25%**" when compared to the 33 study herds. In the herd displayed in Figure 5 the six parameters of this type are highlighted in green boxes. Note that the majority are in the section of somatic cell counts and milk yield.

Herd weaknesses: With the **RANGE** set at the difference between the 25 and 75 percentile herds, the vertical red line represents the performance achieved by the 75 percentile herd (the target, worse by the range). Therefore, any parameter that is to the **left of the vertical red line** would be **"in the worst 25%"** when compared with the 33 study herds. In Figure 5 these parameters are enclosed in red boxes. The obvious weaknesses in this herd are high cull rate and poor conception rate, but as the herd achieved good heat detection rate then average calving interval was better than target level.

Average performance levels: Parameters that fall between the vertical black and red lines would fall within the interquartile range when compared with the 33 study herds.

Figure 5. Highlighting the strengths and weaknesses of a herd



Section 4: Comparison of Key Performance Indicators for the years ending 31/12/2010 and 31/12/2012

The target and median figures from the current study are compared with the results from a similar exercise for the previous year (the year ending 31st December 2010). Table 2 shows changes in the median and target values for each parameter over the interval. The colour of the 2012 value in Table 2 indicates whether it has "improved" (green) or "deteriorated" (red).

Table 2. Comparison of median and target values derived from the two studies of Guernsey NMR recording herds for the year 2010 (33 herds) and the year 2012 (33 herds)

Parameter	**Median**	**Median**		**Target "Best 25%"**	**Target "Best 25%"**
Year of the Data	***2010***	***2012***		***2010***	***2012***
A. Culling rate	25%	25%		20%	21%
B. Culling / death rate in first 100 days of lactation	9%	5%		5%	3%
C. Age at exit (years)	7.1	6.9		7.6	7.5
D. Age at exit by lactations	4.2	4.0		4.9	4.6
E. Percentage Served by day 80	44%	49%		55%	55%
F. Percentage conceived 100 days after calving	18%	20%		29%	32%
G. Calving to 1st service interval (days)	101	89		88	78
H. Calving interval (days)	426	425		408	411
I. Age at 1st calving (years)	2.6	2.6		2.4	2.4
J. Conception rate	33%	29%		42%	33%
K. Percentage service intervals at 18-24 days	33%	34%		40%	41%
L. Percentage service intervals >50 days	33%	27%		20%	19%
M. Percentage eligible for service that served	25%	27%		34%	40%
N. Percentage eligible for service that conceived	8%	9%		11%	11%
O. Lifetime milk / cow / day (kg)	7	8		9	9
P. Milk / cow / year (kg)	5,475	5,235		6,205	5,867
Q. Average protein%	3.61%	3.64%		3.65%	3.69%
R. Average fat%	4.69%	4.85%		4.81%	4.92%
S. 305 day yield (kg)	5,400	5,319		5,900	5,946
T. Average SCC ('000 cells/ml)	222	211		177	169
U. Percentage SCC >=200,000 cells/ml	28%	26%		20%	19%
V. Percentage SCC >500,000 cells/ml	10%	10%		7%	7%
W. Percentage 1st recording SCC >=200,000 cells/ml	22%	21%		18%	18%
X. Percentage chronic SCC >=200,000 cells/ml	16%	15%		10%	10%
Y. Percentage Dry period cure (High:Low)	68%	63%		79%	69%
Z. Percentage Dry period protection (Low:Low)	83%	86%		89%	93%
ZA. Percentage Low at end of previous lactation (SCC<200,000 cells/ml)	61%	65%		68%	78%

Of the 33 herds in the 2012 dataset, 25 were also included in the earlier study. Table 3 shows the change in values for the parameters in this subset of the total herds. Again, the 2012 figure is coloured to indicate improvement (green) or deterioration (red) since the previous year.

Table 3. Comparison of results derived from 25 Guernsey herds included in the two studies

Parameter	Median	Median	Target Top 25%	Target Top 25%	Bottom 25%	Bottom 25%
Year of the Data	*2010*	*2012*	*2010*	*2012*	*2010*	*2012*
A. Culling rate	26%	25%	18%	23%	34%	40%
B. Culling / death rate in first 100 days of lactation	8%	5%	5%	4%	11%	9%
C. Age at exit (years)	6.5	6.7	7.6	7.3	6.2	6.1
D. Age at exit by lactations	3.7	3.8	4.5	4.2	3.4	3.4
E. Percentage Served by day 80	42%	44%	54%	52%	31%	40%
F. Percentage conceived 100 days after calving	18%	21%	27%	32%	14%	12%
G. Calving to 1st service interval (days)	101	92	94	81	124	110
H. Calving interval (days)	424	427	407	420	436	446
I. Age at 1st calving (years)	2.6	2.6	2.4	2.4	2.8	2.7
J. Conception rate	32%	28%	40%	33%	24%	25%
K. Percentage service intervals at 18-24 days	33%	34%	41%	40%	27%	27%
L. Percentage service intervals >50 days	35%	29%	21%	19%	42%	40%
M. Percentage eligible for service that served	25%	28%	30%	40%	20%	26%
N. Percentage eligible for service that conceived	8%	9%	11%	12%	5%	5%
O. Lifetime milk / cow / day (kg)	7	8	8	9	7	6
P. Milk / cow / year (kg)	5,475	5,504	6,205	5,976	4,745	4,761
Q. Average protein%	3.62%	3.61%	3.65%	3.70%	3.53%	3.54%
R. Average fat%	4.72%	4.86%	4.81%	4.92%	4.62%	4.74%
S. 305 day yield (kg)	5,356	5,414	5,788	5,946	4,781	5,093
T. Average SCC ('000 cells/ml)	203	243	170	183	243	311
U. Percentage SCC >=200,000 cells/ml	25%	32%	20%	22%	31%	37%
V. Percentage SCC >500,000 cells/ml	10%	11%	7%	8%	12%	16%
W. Percentage 1st recording SCC >=200,000 cells/ml	22%	25%	16%	21%	28%	29%
X. Percentage chronic SCC >=200,000 cells/ml	16%	18%	10%	14%	17%	22%
Y. Percentage Dry period cure (High:Low)	69%	63%	82%	69%	58%	58%
Z. Percentage Dry period protection (Low:Low)	83%	83%	89%	91%	71%	77%
ZA. Percentage Low at end of previous lactation (SCC<200,000 cells/ml)	64%	63%	68%	72%	53%	51%

Appendix 1. Key Performance Indicators definitions

The Key Performance Indicators are displayed as both 12 month and 3 month rolling averages.
In the following definitions the average population of cows is calculated using animal days. Every day that a cow is present and in the population at risk during the period of study is a 365th of an animal year. The total animal days is summed and divided by 365 to give animal years, or the average cow population at risk.

Parameter	**Description**
A. Culling rate	The number of cows dying or culled during the 12 month period expressed as a percentage of the average cow population for the same 12 month period.
B. Culling / death rate in first 100 days of lactation	The number of deaths/culls within 100 days of calving divided by the average cow population up to 100 days (aggregated total animal days up to 100 days after calving, divided by 365).
C. Age at exit (years)	The average age (in days) of cows culled/died in the analysis period, divided by 365.24
D. Age at exist by lactations	The total number of lactations completed by cows culled/died in the analysis period, divided by the number of these culled/died cows.
E. Percentage Served by day 80	The percentage of cows reaching the 80th day after calving that have been served at least once on or by Day 80.
F. Percentage conceived 100 days after calving	The percentage of cows reaching 100 days after calving that have conceived on or by Day 100.
G. Calving to 1st service interval (days)	The average days between calving and 1st service for all cows served for the first time in a lactation during the analysis period.
H. Calving interval (days)	The interval between calvings, in days, for all re-calvings recorded in the analysis period.
I. Age at 1st calving (years)	The age at first calving for all cows calving for the first time during the analysis period.
J. Conception rate	The number of conceptions as a percentage of the total number of services (services to cows culled are included) during the analysis period.
K. Percentage service intervals at 18-24 days	The percentage of all service intervals for cows returning to service during the analysis period that are between 18 and 24 days (equating to one oestrus cycle after the previous service).
L. Percentage service intervals >50 days	The percentage of all service intervals for cows returning to service during the analysis period that are over 50 days.
M. Percentage eligible for service that served	The percentage of cows that are eligible for service (42 days+ after calving) during the analysis period that are served.
N. Percentage eligible for service that conceived	The percentage of cows that are eligible for service (42 days+ after calving) during the analysis period that conceived.
O. Lifetime milk / cow / day (kg)	The average of total milk yield divided by age in days (from birth to culling) for cows leaving the herd during the analysis period.
P. Milk / cow / year (kg)	The total milk produced per cow place in the year. The total milk divided by the average population of cows (both in milk and dry).
Q. Average protein%	The average protein% of all milk recorded during the analysis period.
R. Average fat%	The average fat% of all milk recorded during the analysis period.
S. 305 day yield (kg)	The average production by Day 305 for all cows reaching 305 days after calving during the analysis period.

T. Average SCC ('000 cells/ml)	The average somatic cell count of all milk recorded during the analysis period.
U. Percentage SCC >=200,000 cells/ml	The percentage of all recorded milk samples during the analysis period that had an individual SCC reading of 200,000 cells/ml or higher.
V. Percentage SCC >500,000 cells/ml	The percentage of all recorded milk samples during the analysis period that had an individual SCC reading of 500,000 cells/ml or higher.
W. Percentage 1st recording SCC >=200,000 cells/ml	The percentage of all cows starting new lactations that had a high SCC (>=200,000 cells/ml) reading at the first milk recording in the lactation.
X. Percentage chronic SCC >=200,000 cells/ml	The percentage of all milk samples taken in the analysis period that originated from chronic SCC cows where the current and previous milk samples both had SCC levels of 200,000 cells/ml milk or greater.
Y. Percentage Dry period cure (High:Low)	Of re-calving cows recorded starting a new lactation during the analysis period: the percentage of cows ending the previous lactation with a HIGH SCC (>=200,000 cells/ml) that started the new lactation with a LOW SCC (<200,000 cells/ml).
Z. Percentage Dry period protection (Low:Low)	Of re-calving cows recorded starting a new lactation during the analysis period: the percentage of cows ending the previous lactation with a LOW SCC (<200,000 cells/ml) that also started the new lactation with a LOW SCC (<200,000 cells/ml).
ZA. Percentage Low at end of previous lactation (SCC<200,000 cells/ml)	Of re-calving cows recorded starting a new lactation during the analysis period: The percentage that had a LOW SCC (<200,000 cells/ml) at the last milk recording in the previous lactation.