

Calf mortality and seasonality of 410-day calving interval condition

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SSBSS Reform Stakeholder Group

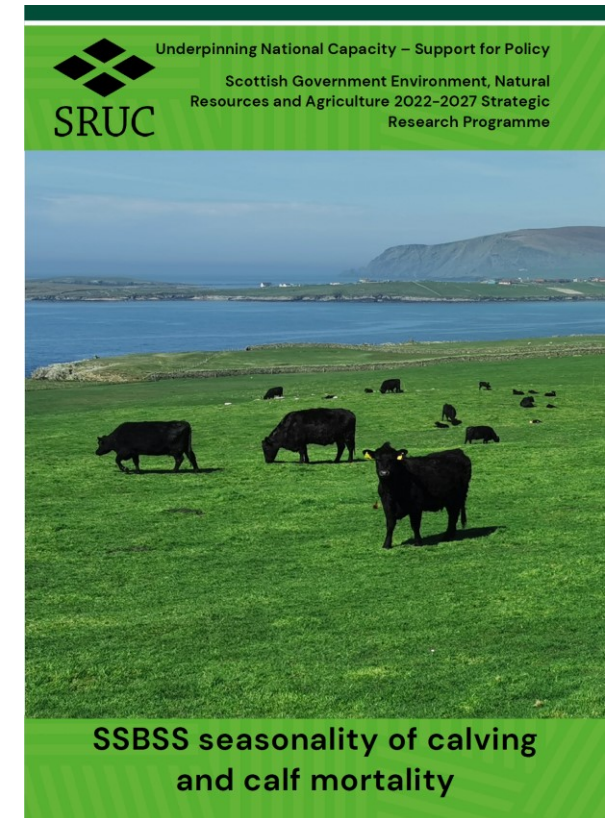
20th August 2024

An output from 2022-27 Strategic Research Programme



Background

- Request from SG to look at calf mortality & follow up from industry requests to look at calving intervals based on seasonality of calving
- Data extracts from **EGENES** – CTS (including ScotEID) data under agreement with APHA and devolved administrations
- Acknowledging Ian Archibald and Mike Coffey



Scottish Government
Riaghaltas na h-Alba
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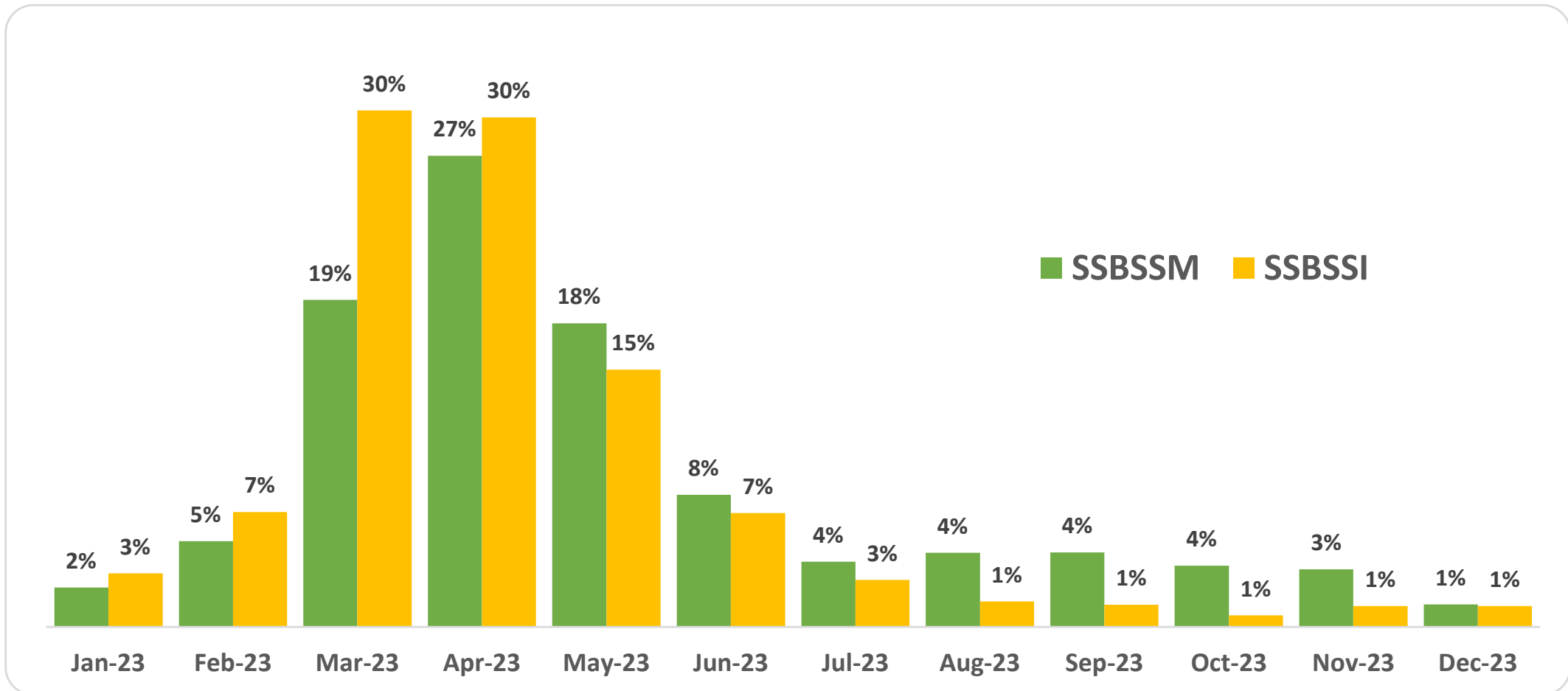


Animal &
Plant Health
Agency



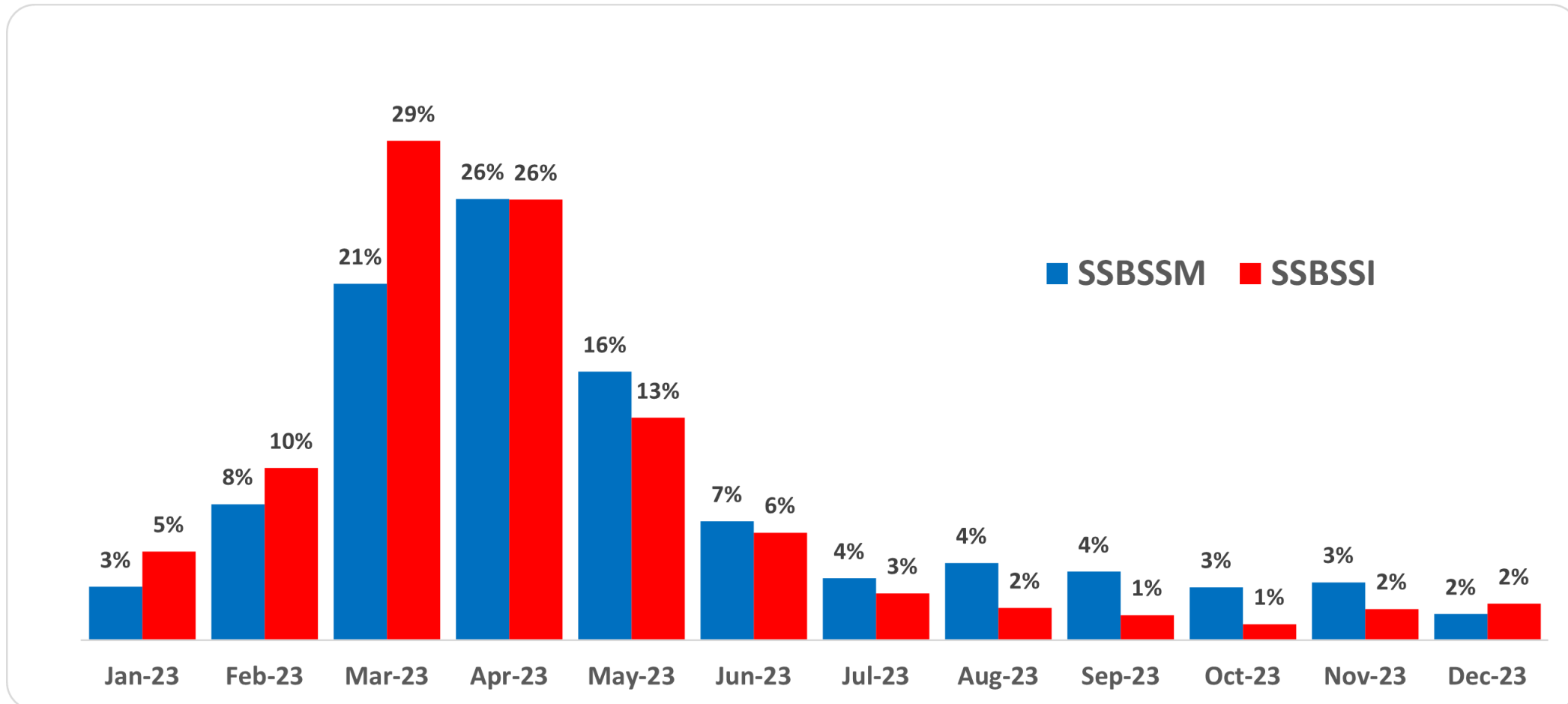
Calving Seasonality

Proportion of 2023 non-dairy dams on SSBSS holdings by calf registration month



Heifer Calving Seasonality

Proportion of 2023 non-dairy heifers on SSBSS holdings by calf registration month



Heifer & Cow Calving Seasonality

Proportion of non-dairy breed cows and heifers by calf registration month on holdings associated with BRNs claiming SSBSS, 2023

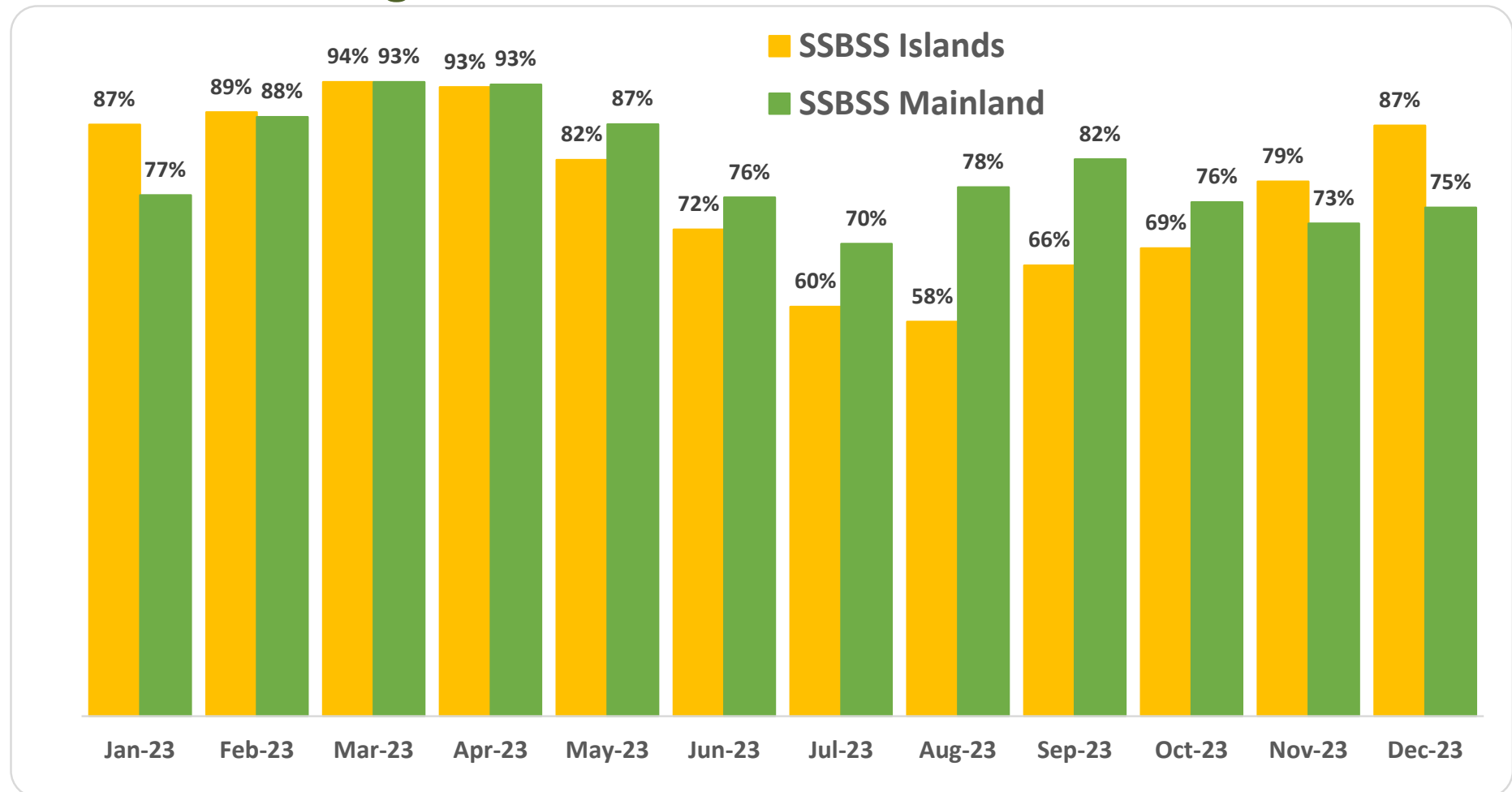
| | SSBSS | | SSBSSM | | SSBSSI | |
|--------|---------|-------|---------|-------|---------|-------|
| | Heifers | Cows | Heifers | Cows | Heifers | Cows |
| Jan-23 | 3.3% | 1.8% | 3.1% | 1.8% | 5.2% | 2.3% |
| Feb-23 | 8.1% | 3.8% | 7.9% | 5.0% | 10.0% | 6.7% |
| Mar-23 | 21.6% | 16.6% | 20.7% | 19.1% | 29.0% | 30.2% |
| Apr-23 | 25.7% | 23.4% | 25.7% | 27.5% | 25.6% | 29.8% |
| May-23 | 15.3% | 14.8% | 15.6% | 17.7% | 12.9% | 15.0% |
| Jun-23 | 6.9% | 6.4% | 6.9% | 7.7% | 6.3% | 6.6% |
| Jul-23 | 3.5% | 3.1% | 3.6% | 3.8% | 2.7% | 2.7% |
| Aug-23 | 4.2% | 3.3% | 4.5% | 4.3% | 1.9% | 1.5% |
| Sep-23 | 3.7% | 3.4% | 4.0% | 4.3% | 1.5% | 1.3% |
| Oct-23 | 2.9% | 2.8% | 3.1% | 3.6% | 0.9% | 0.7% |
| Nov-23 | 3.2% | 2.6% | 3.4% | 3.4% | 1.8% | 1.2% |
| Dec-23 | 1.6% | 1.0% | 1.5% | 1.3% | 2.1% | 1.2% |

Importance of calving period

- Caldow et al (2005): *“extending the breeding season can hide poor conception rates and prolonged periods of anoestrus. For instance, while this increases the number of calves born, these animals are younger and therefore under weight at weaning or sale. For maximum efficiency, cows must produce a calf per year at an intercalving interval of close to 365 days in a breeding season that is restricted to nine weeks.”*

Last calf – monthly CI performance

Proportion of dams meeting 410-day calving interval criteria by calf registration month on holdings associated with SSBSS mainland and island claims, 2023



Last calf – monthly CI performance

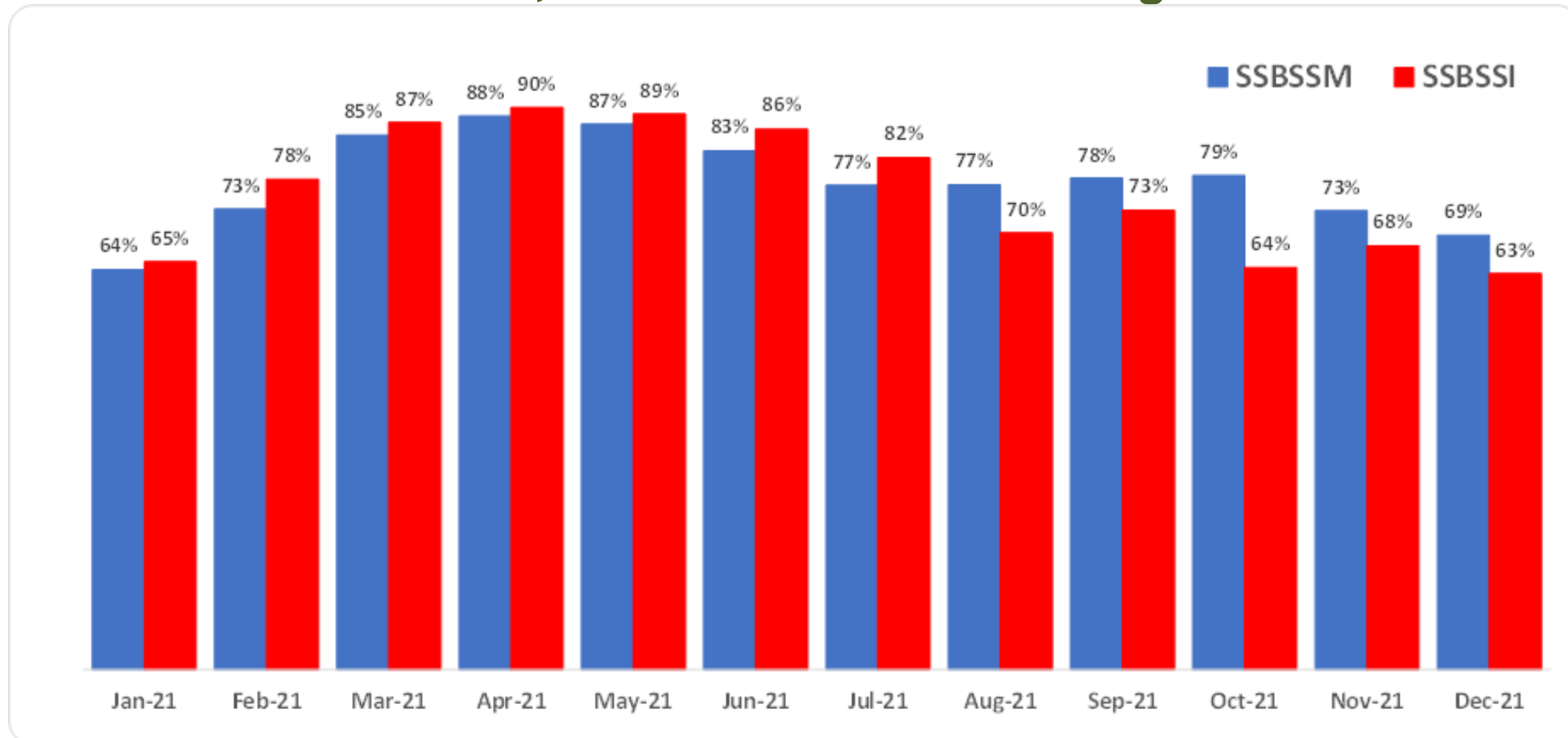


Proportion of dams meeting 410-day calving interval criteria by calf registration month on holdings associated with SSBSS mainland and island claims, 2023

| | SSBSS Islands | | | | SSBSS Mainland | | | |
|--------|---------------|----------|------------|----------|----------------|----------|------------|----------|
| | Total dams | | Total Cows | | Total dams | | Total Cows | |
| | Head | % 410 CI | Head | % 410 CI | Head | % 410 CI | Head | % 410 CI |
| Jan-23 | 1,136 | 87% | 834 | 83% | 6,837 | 77% | 5,253 | 70% |
| Feb-23 | 2,438 | 89% | 1,852 | 86% | 14,917 | 88% | 10,868 | 84% |
| Mar-23 | 10,955 | 94% | 9,255 | 92% | 56,984 | 93% | 46,389 | 92% |
| Apr-23 | 10,809 | 93% | 9,309 | 92% | 82,086 | 93% | 68,968 | 92% |
| May-23 | 5,453 | 82% | 4,696 | 79% | 52,908 | 87% | 44,928 | 85% |
| Jun-23 | 2,413 | 72% | 2,046 | 67% | 23,025 | 76% | 19,490 | 72% |
| Jul-23 | 994 | 60% | 834 | 53% | 11,331 | 70% | 9,493 | 64% |
| Aug-23 | 538 | 58% | 428 | 47% | 12,920 | 78% | 10,622 | 73% |
| Sep-23 | 468 | 66% | 382 | 59% | 12,944 | 82% | 10,911 | 79% |
| Oct-23 | 245 | 69% | 190 | 60% | 10,657 | 76% | 9,084 | 72% |
| Nov-23 | 439 | 79% | 332 | 72% | 10,009 | 73% | 8,287 | 67% |
| Dec-23 | 441 | 87% | 317 | 82% | 3,914 | 75% | 3,138 | 69% |

Second last calf – monthly CI performance

Proportion of previously calved cows meeting 410-day calving interval criteria by second last calf registration month on holdings associated with SSBSS mainland and island claims, 2021 second last calving date



Last calf – monthly CI performance



Number and proportion of previously calved cows meeting 410-day calving interval criteria by second last calf registration month on holdings associated with SSBSS mainland and island claims, 2021 second last calving date

| 2 nd last calving date | SSBSSM | | | SSBSSI | | |
|-----------------------------------|----------------|---------------------|----------|----------------|---------------------|----------|
| | Cows with calf | Cows meeting 410 CI | % 410 CI | Cows with calf | Cows meeting 410 CI | % 410 CI |
| Jan-21 | 5,649 | 3,602 | 64% | 995 | 647 | 65% |
| Feb-21 | 12,325 | 9,052 | 73% | 2,116 | 1,654 | 78% |
| Mar-21 | 48,111 | 41,006 | 85% | 8,788 | 7,666 | 87% |
| Apr-21 | 67,078 | 59,194 | 88% | 8,981 | 8,044 | 90% |
| May-21 | 42,508 | 36,977 | 87% | 5,022 | 4,448 | 89% |
| Jun-21 | 18,535 | 15,333 | 83% | 2,035 | 1,754 | 86% |
| Jul-21 | 10,240 | 7,906 | 77% | 794 | 648 | 82% |
| Aug-21 | 11,091 | 8,572 | 77% | 375 | 261 | 70% |
| Sep-21 | 11,681 | 9,149 | 78% | 351 | 257 | 73% |
| Oct-21 | 8,718 | 6,869 | 79% | 259 | 166 | 64% |
| Nov-21 | 7,745 | 5,668 | 73% | 555 | 375 | 68% |
| Dec-21 | 3,942 | 2,729 | 69% | 526 | 332 | 63% |

Calf Mortality

- Mõtus, et al, (2017) "...considerable research is available that identified risk factors for the mortality of young calves. Examples include **dystocia**, **climatic conditions** during calving, **length of the calving period**, large calf **birth weight** and **male sex** of the newborn calf. In young **beef calves**, it is known that **diarrhoea** and **respiratory disease** are the two most common causes of mortality." <https://doi.org/10.1017/S1751731117003548>

Not only is calf lost – dam essentially becomes unproductive unless twinned calf found (£ and CO₂e)

| FERTILITY | NUMBER | | % |
|------------------|------------|------------|--------------|
| Cows to bull | 1822 | | - |
| Not in calf | 212 | | 11.6% |
| Twins / triplets | 67 | | 3.6% |
| Calves conceived | 1679 | | 92% |
| CALF LOSSES | Cows | Calves | % |
| Cow died | 16 | 16 | 1% |
| Abortion | 53 | 55 | 3.3% |
| Stillbirth | 45 | 52 | 3.1% |
| Neonatal death | 29 | 29 | 1.7% |
| Older death | 25 | 25 | 1.5% |
| TOTAL | 168 | 177 | 10.6% |

Beef calf mortality on holding of birth



On farm mortality of non-dairy calf breeds within 365 days of birth (on the holding of birth) - holdings associated with SSBSS claims – by year of birth 2015-2022

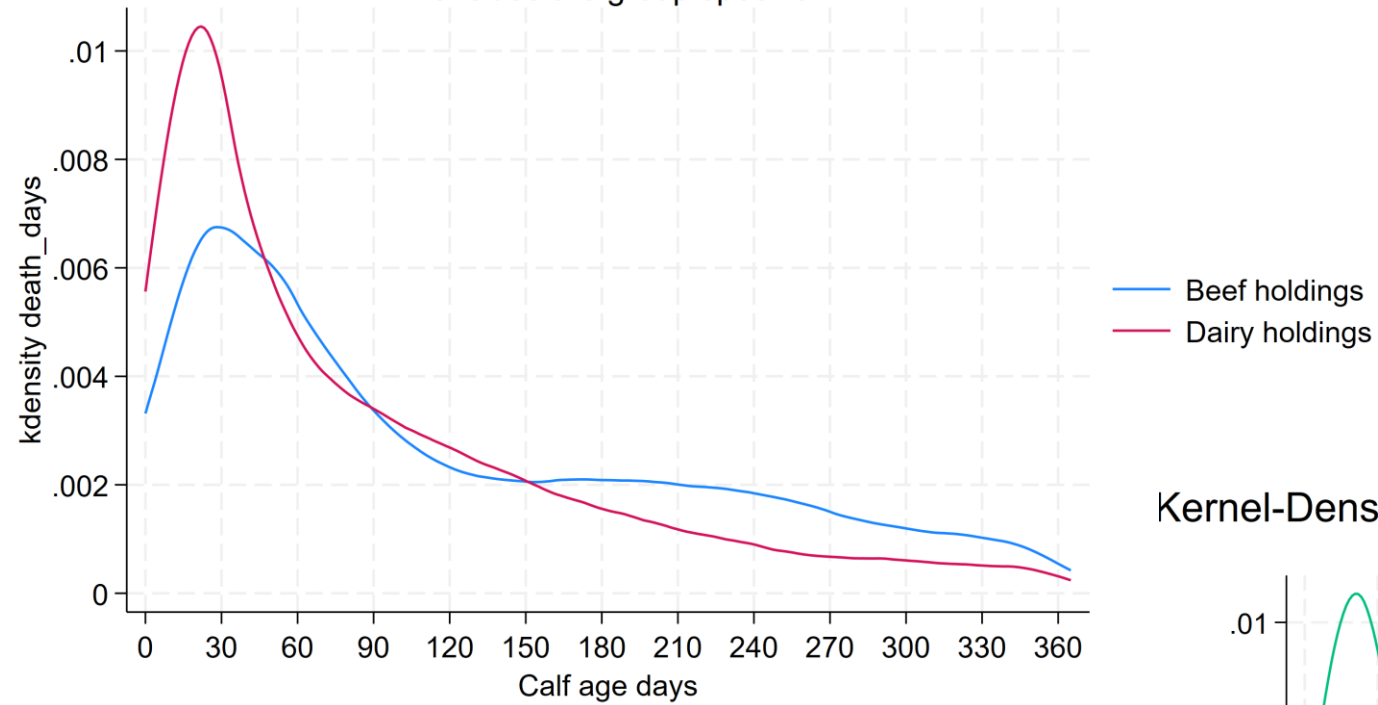
| Year of birth | Registered Calves | Mainland On farm mortality – holding of birth, <365 days old | | Registered Calves | Islands On farm mortality – holding of birth, <365 days old | |
|---------------|-------------------|---|------------------------|-------------------|--|------------------------|
| | | Calves | % of registered calves | | Calves | % of registered calves |
| 2015 | 348,291 | 20,089 | 5.8% | 41,369 | 2,431 | 5.9% |
| 2016 | 344,502 | 19,647 | 5.7% | 39,237 | 2,180 | 5.6% |
| 2017 | 339,313 | 21,495 | 6.3% | 39,758 | 2,360 | 5.9% |
| 2018 | 336,697 | 19,115 | 5.7% | 39,337 | 2,113 | 5.4% |
| 2019 | 335,857 | 18,736 | 5.6% | 39,336 | 2,062 | 5.2% |
| 2020 | 339,002 | 18,407 | 5.4% | 39,885 | 1,960 | 4.9% |
| 2021 | 330,242 | 17,026 | 5.2% | 39,278 | 1,902 | 4.8% |
| 2022 | 328,910 | 16,651 | 5.1% | 39,865 | 1,884 | 4.7% |
| Average | 337,852 | 18,896 | 5.6% | 39,758 | 2,112 | 5.3% |

improvement



Kernel-Density Plots of calf mortality on birth holding 2023

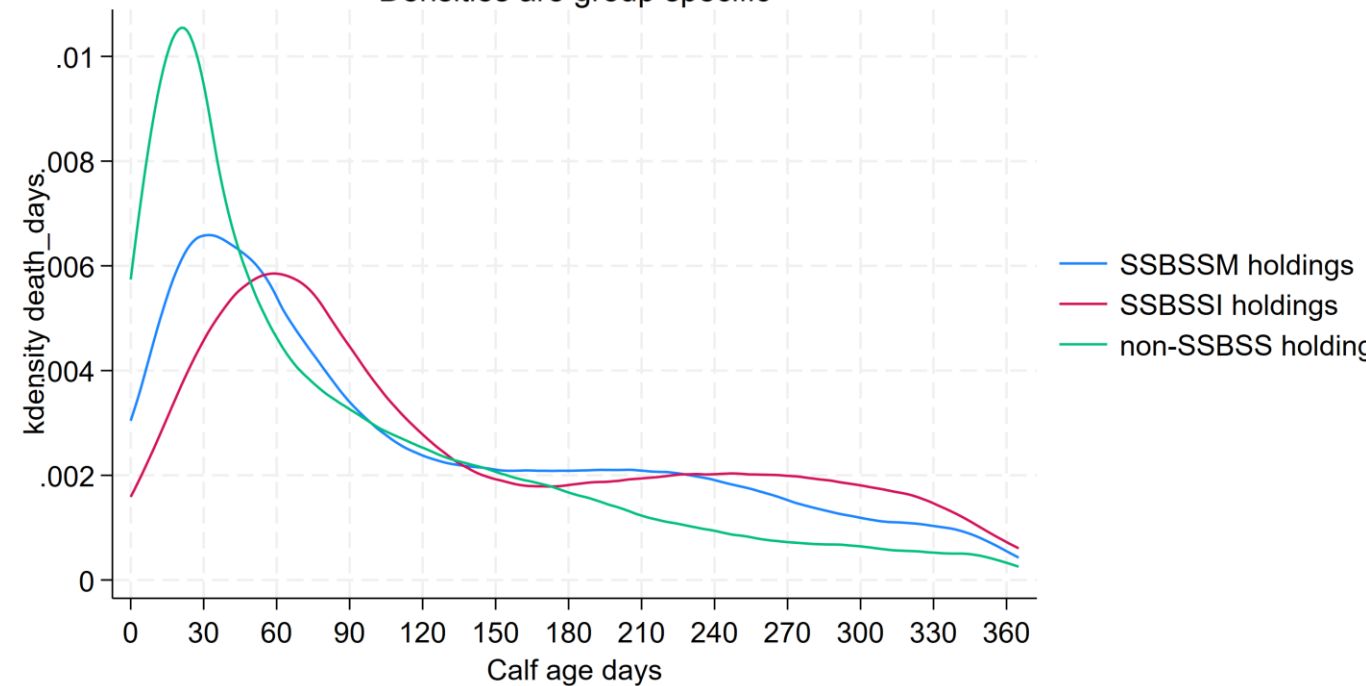
Densities are group specific



Calf Mortality Type of holding

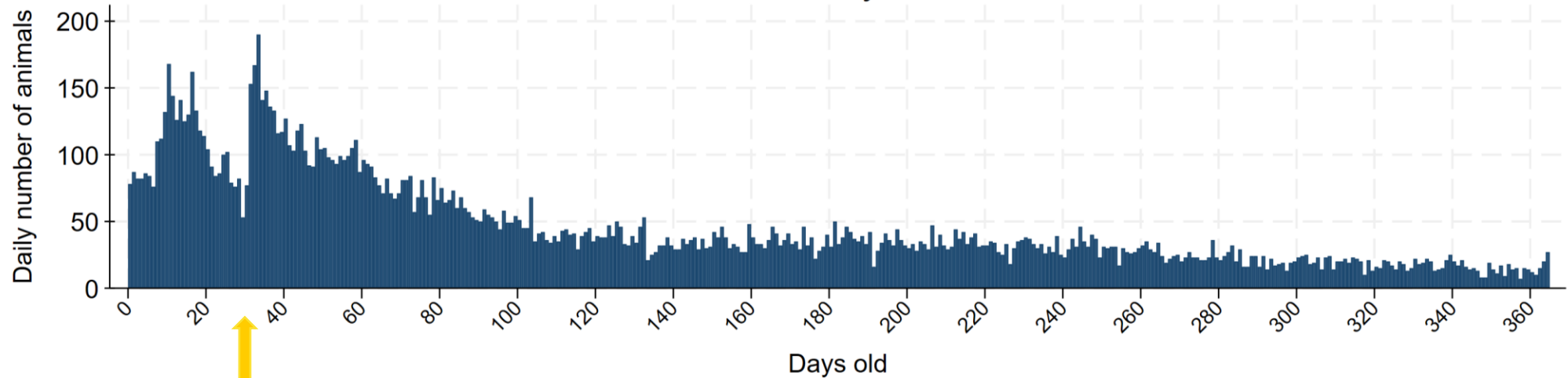
Kernel-Density Plots of SSBSS calf mortality on birth holding 2023

Densities are group specific

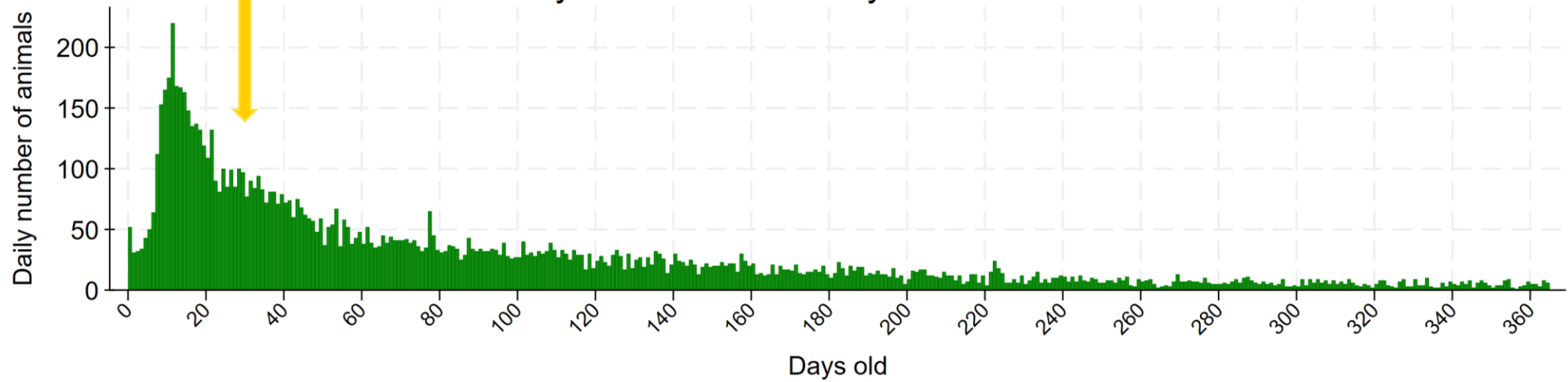


Calf Mortality – Detail

Beef farms calf mortality on birth farm 2023

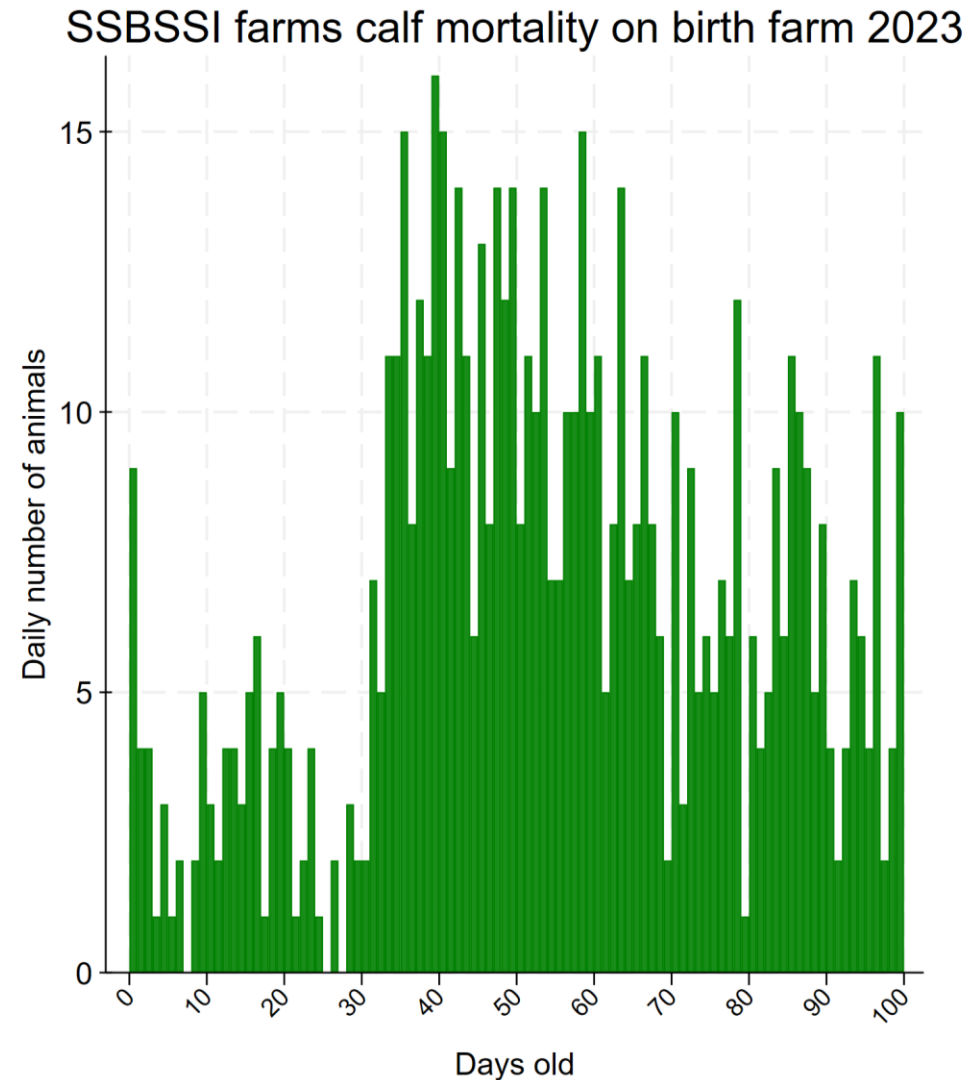
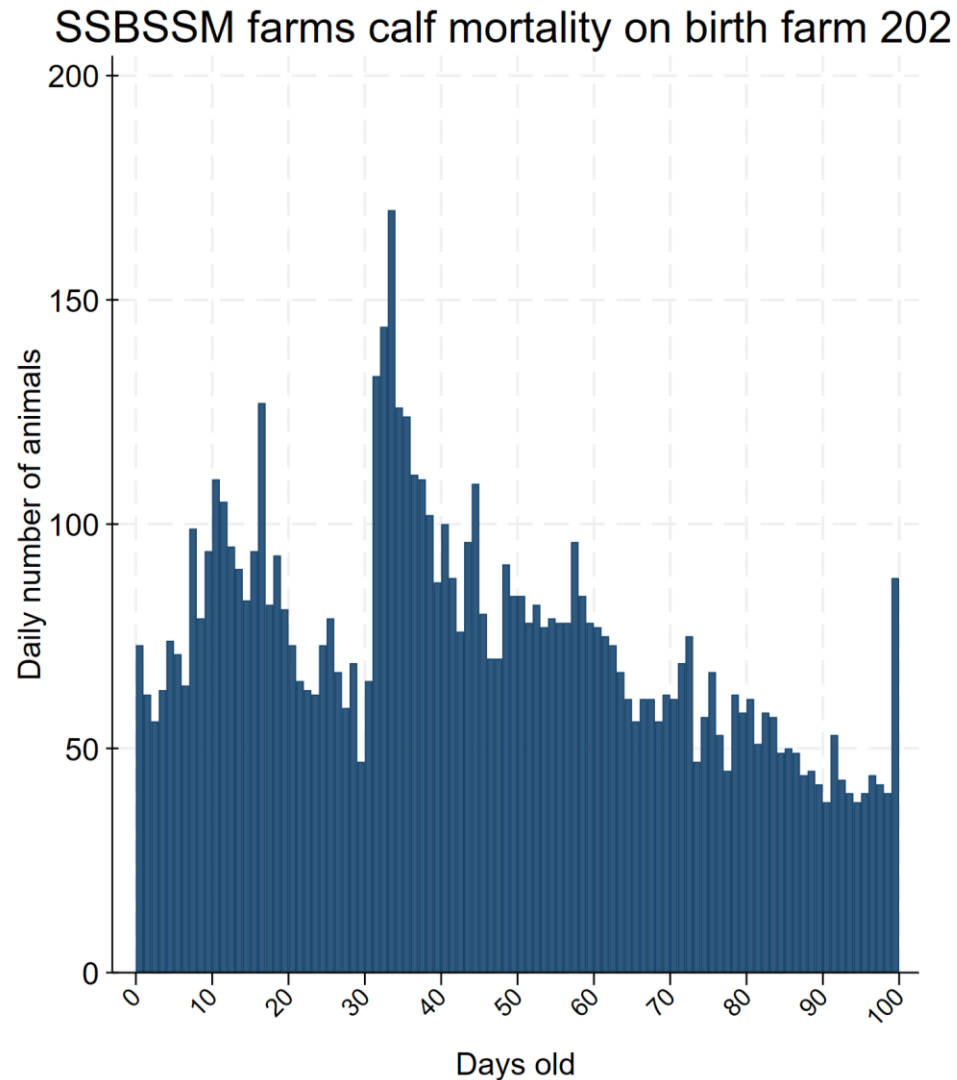


Dairy farms calf mortality on birth farm 2023



**Calf deaths –
impact ££ and
GHGs (cow & calf)**

Calf Mortality SSBSS holdings



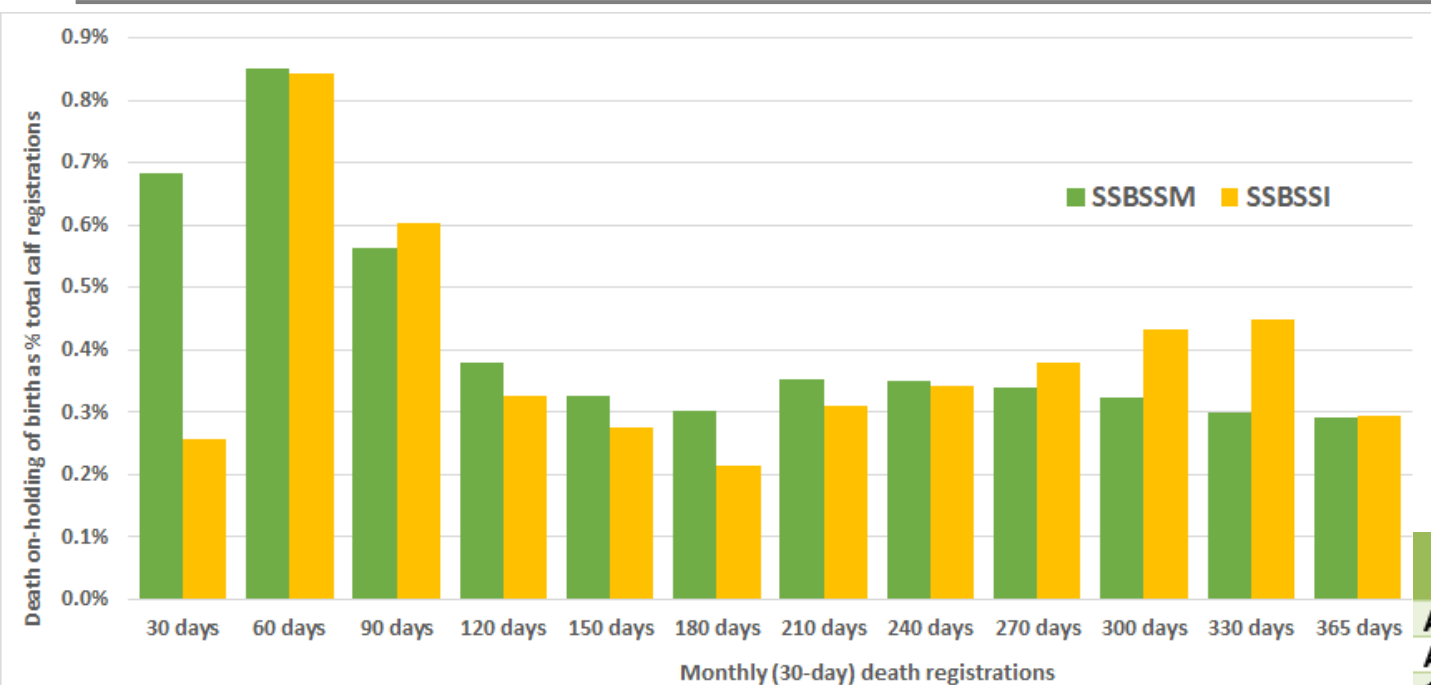
Beef calf mortality on holding of birth



Number and proportion of non-dairy breed calves born in 2022 dying on the holding of birth when under 365 days old – on holdings associated to a business claiming SSBSS support

| On-holding-of-birth calf mortality age | Mainland cumulative calf mortality | | Island cumulative calf mortality | |
|--|------------------------------------|---------------------|----------------------------------|---------------------|
| | Calf deaths | % registered calves | Calf deaths | % registered calves |
| Within 30 days | 2,248 | 0.7% | 102 | 0.3% |
| Within 60 days | 5,051 | 1.5% | 438 | 1.1% |
| Within 90 days | 6,901 | 2.1% | 679 | 1.7% |
| Within 120 days | 8,147 | 2.5% | 809 | 2.0% |
| Within 150 days | 9,218 | 2.8% | 919 | 2.3% |
| Within 180 days | 10,216 | 3.1% | 1,004 | 2.5% |
| Within 210 days | 11,375 | 3.5% | 1,128 | 2.8% |
| Within 240 days | 12,524 | 3.8% | 1,264 | 3.2% |
| Within 270 days | 13,642 | 4.1% | 1,415 | 3.5% |
| Within 300 days | 14,704 | 4.5% | 1,588 | 4.0% |
| Within 330 days | 15,693 | 4.8% | 1,767 | 4.4% |
| Within 365 days | 16,651 | 5.1% | 1,884 | 4.7% |
| Total Calves | 328,910 | | 39,865 | |

Beef calf mortality – geographic variation



Ratio of 30:60 day
mortality variation

| | Registered calves | 30 days | 60 days | 90 days | 120 days |
|---------------------|-------------------|---------|---------|---------|----------|
| Argyll & Bute | 16,729 | 0.5% | 1.2% | 1.7% | 2.2% |
| Ayrshire | 27,466 | 0.8% | 1.7% | 2.2% | 2.7% |
| Clyde Valley | 25,211 | 0.8% | 1.5% | 2.2% | 2.6% |
| Dumfries & Galloway | 67,293 | 0.8% | 1.6% | 2.2% | 2.5% |
| East Central | 10,378 | 0.6% | 1.1% | 1.8% | 2.2% |
| Eileanan an Iar | 1,975 | 0.2% | 0.7% | 1.0% | 1.2% |
| Fife | 10,959 | 0.6% | 1.5% | 2.2% | 2.6% |
| Highland | 38,553 | 0.4% | 1.0% | 1.5% | 1.8% |
| Lothian | 11,747 | 0.8% | 1.5% | 1.9% | 2.3% |
| NE Scotland | 67,766 | 0.7% | 1.9% | 2.7% | 3.2% |
| Orkney | 24,478 | 0.2% | 1.2% | 1.9% | 2.2% |
| Scottish Borders | 37,901 | 0.5% | 1.1% | 1.5% | 1.7% |
| Shetland | 1,429 | 0.4% | 1.6% | 2.0% | 2.1% |
| Tayside | 26,890 | 0.8% | 1.5% | 2.1% | 2.3% |
| Scotland | 368,775 | 0.6% | 1.5% | 2.1% | 2.4% |

What can the BES data tell us?

Annual summary of Beef Efficiency Scheme calves, self-calving dams, unregistered calves, and registered calf deaths; 2016-2020

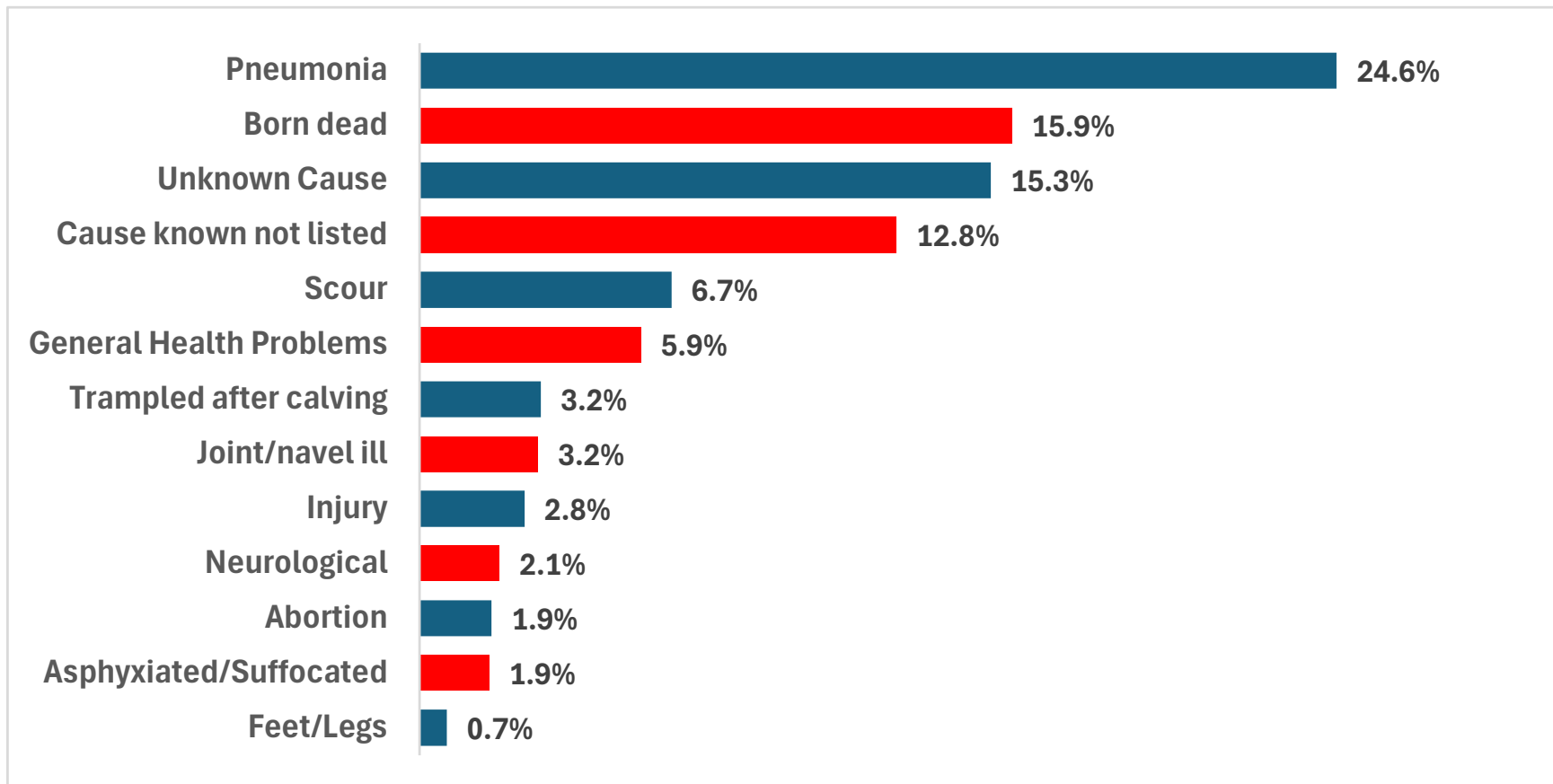
| Calving year | 2016 | 2017 | 2018 | 2019 | 2020 |
|-----------------------------------|---------|---------|---------|---------|---------|
| Calves | 173,635 | 154,459 | 144,260 | 142,426 | 137,233 |
| % Self-calved dams | 147,444 | 133,881 | 124,205 | 124,966 | 120,959 |
| Self-calved dams | 84.9% | 86.7% | 86.1% | 87.7% | 88.1% |
| Unregistered calves (birth death) | 3,265 | 2,178 | 1,687 | 1,379 | 1,179 |
| % Unregistered calves | 1.9% | 1.4% | 1.2% | 1.0% | 0.9% |
| Calf death <365 days | 6,606 | 5,972 | 5,490 | 4,830 | 3,205 |
| % Calf death <365 days | 3.8% | 3.9% | 3.8% | 3.4% | 2.3% |



Lower than population – better performing herds?

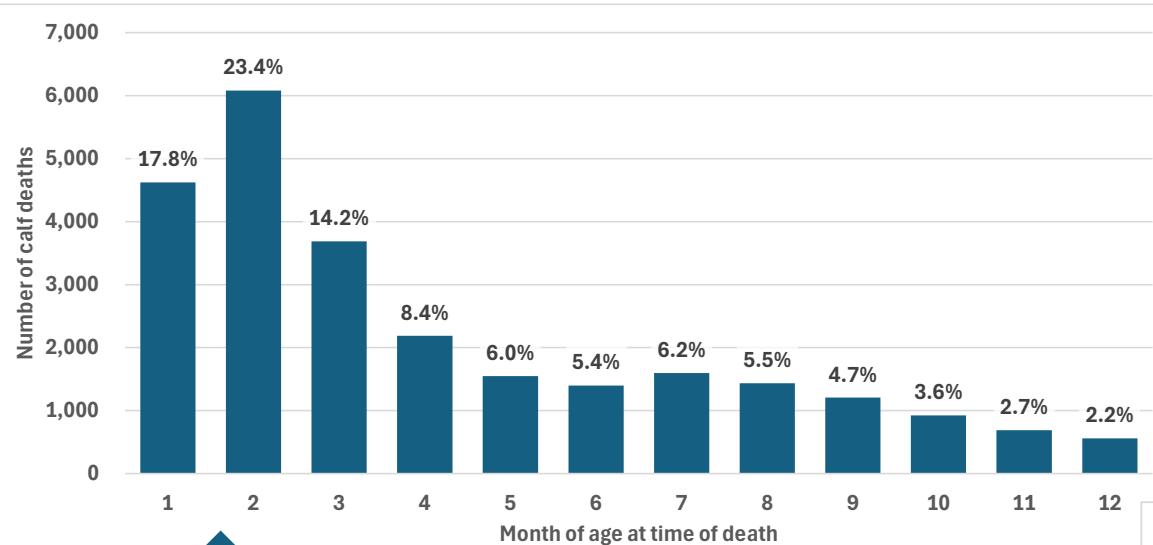
BES – Cause of death

Cause of death of registered and unregistered BES calves under 365 days old (2016 – 2020)



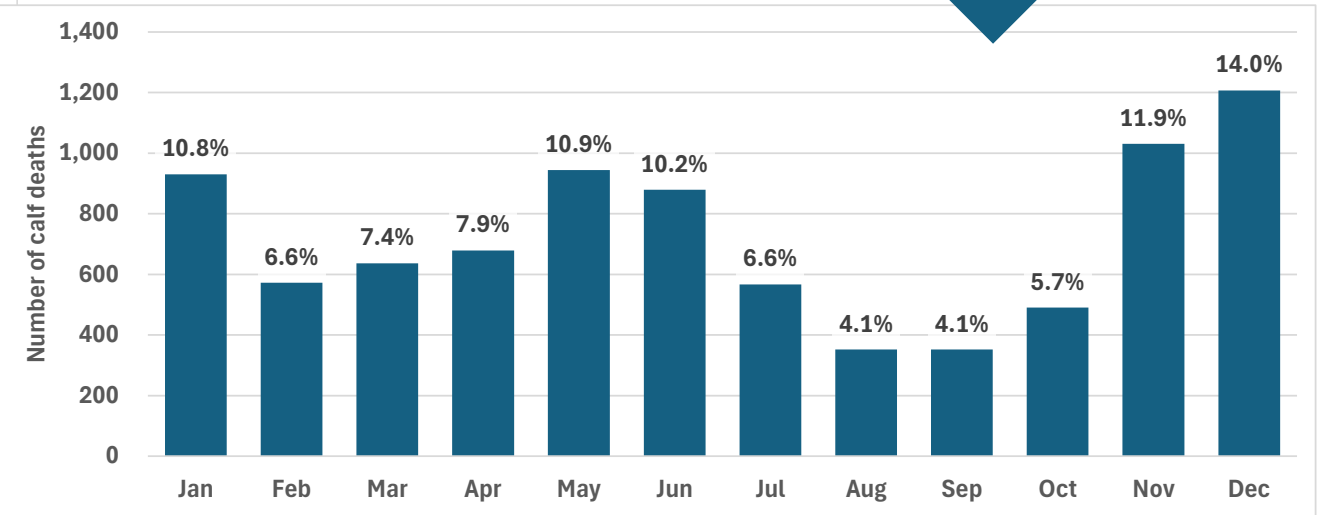
BES – Cause of death

Age bracket (month of life) for BES calf deaths (registered calves), 2016-2020



Similar to population

BES registered calf deaths due to pneumonia by month of death for calves under 1 year of age, 2016-2022



Changing retention period? – off moves



| SSBSSM | Cumulative | | | | | | | | |
|---------------|--------------------|-------|-------|-------|--------|--------|--------|--------|---------|
| year of birth | calf registrations | off30 | off60 | off90 | off120 | off30% | off60% | off90% | off120% |
| 2015 | 348,291 | 1,204 | 4,889 | 7,621 | 9,126 | 0.35% | 1.40% | 2.19% | 2.62% |
| 2016 | 344,502 | 964 | 4,369 | 7,114 | 8,707 | 0.28% | 1.27% | 2.07% | 2.53% |
| 2017 | 339,313 | 898 | 4,362 | 6,859 | 8,262 | 0.26% | 1.29% | 2.02% | 2.43% |
| 2018 | 336,697 | 663 | 3,614 | 6,091 | 7,273 | 0.20% | 1.07% | 1.81% | 2.16% |
| 2019 | 335,857 | 711 | 3,911 | 6,333 | 7,594 | 0.21% | 1.16% | 1.89% | 2.26% |
| 2020 | 339,002 | 749 | 4,079 | 6,889 | 8,472 | 0.22% | 1.20% | 2.03% | 2.50% |
| 2021 | 330,242 | 907 | 4,221 | 7,114 | 8,638 | 0.27% | 1.28% | 2.15% | 2.62% |
| 2022 | 328,910 | 769 | 3,452 | 5,830 | 7,239 | 0.23% | 1.05% | 1.77% | 2.20% |

| SSBSSI | Cumulative | | | | | | | | |
|---------------|--------------------|-------|-------|-------|--------|--------|--------|--------|---------|
| year of birth | calf registrations | off30 | off60 | off90 | off120 | off30% | off60% | off90% | off120% |
| 2015 | 41,369 | 277 | 513 | 736 | 937 | 0.67% | 1.24% | 1.78% | 2.26% |
| 2016 | 39,237 | 136 | 314 | 479 | 677 | 0.35% | 0.80% | 1.22% | 1.73% |
| 2017 | 39,758 | 144 | 394 | 610 | 844 | 0.36% | 0.99% | 1.53% | 2.12% |
| 2018 | 39,337 | 160 | 407 | 581 | 810 | 0.41% | 1.03% | 1.48% | 2.06% |
| 2019 | 39,336 | 127 | 326 | 481 | 655 | 0.32% | 0.83% | 1.22% | 1.67% |
| 2020 | 39,885 | 150 | 379 | 566 | 763 | 0.38% | 0.95% | 1.42% | 1.91% |
| 2021 | 39,278 | 221 | 401 | 540 | 694 | 0.56% | 1.02% | 1.37% | 1.77% |
| 2022 | 39,865 | 152 | 293 | 471 | 669 | 0.38% | 0.73% | 1.18% | 1.68% |

What about heifers with calf at foot?

- Caldow et al (2005) *"even young cows, when given the opportunity, will achieve calving intervals below 365 days and repeat this for the next breeding season...despite the obvious constraints, the physiology of beef cows is not a barrier to achieving the requisite level of reproductive performance in a nine-week breeding season."*
- Noted higher rate of dystocia (difficult calving) in heifers, and that dystocia affects calf survival rates, a *"heifer management programme will have a beneficial effect in this area, but that is only half of the solution. The paternal influence on dystocia can be managed by careful bull selection."*

| SSBSSM | | | |
|--------|---------------|------------------------------------|------|
| Year | Second calver | Second calver on different holding | |
| | | Head | % |
| 2016 | 42,525 | 3,163 | 7.4% |
| 2017 | 46,871 | 3,981 | 8.5% |
| 2018 | 47,651 | 3,931 | 8.2% |
| 2019 | 49,128 | 4,047 | 8.2% |
| 2020 | 49,633 | 3,809 | 7.7% |
| 2021 | 48,336 | 3,904 | 8.1% |
| 2022 | 48,956 | 3,907 | 8.0% |
| 2023 | 48,387 | 3,382 | 7.0% |

| SSBSSM | | | |
|--------|---------------|------------------------------------|------|
| Year | Second calver | Second calver on different holding | |
| | | Head | % |
| 2016 | 4,616 | 99 | 2.1% |
| 2017 | 5,327 | 158 | 3.0% |
| 2018 | 5,449 | 226 | 4.1% |
| 2019 | 5,416 | 178 | 3.3% |
| 2020 | 5,543 | 182 | 3.3% |
| 2021 | 5,664 | 196 | 3.5% |
| 2022 | 5,527 | 171 | 3.1% |
| 2023 | 5,644 | 191 | 3.4% |

Payment rates – retention periods



| SSBSSM | | | | | | | | | | |
|--|--------------------|--------------|--------------|----------|---------------------|-------------|---------------------|-------------|----------------------|--------------|
| Payment rates with changed retention periods | | | | | | | | | | |
| year of birth | calf registrations | Total Budget | 410 Eligible | 410 rate | 60 Extra Ineligible | 410–60 rate | 90 Extra Ineligible | 410–90 rate | 120 Extra Ineligible | 410–120 rate |
| 2015 | 348,291 | £26,488,937 | 294,764 | £89.86 | 7,248 | £92.13 | 5,066 | £93.78 | 3,176 | £94.85 |
| 2016 | 344,502 | £32,474,926 | 295,840 | £109.77 | 6,677 | £112.31 | 5,005 | £114.28 | 3,199 | £115.59 |
| 2017 | 339,313 | £34,083,901 | 287,278 | £118.64 | 6,760 | £121.50 | 4,922 | £123.67 | 3,175 | £125.12 |
| 2018 | 336,697 | £34,192,756 | 291,079 | £117.47 | 6,290 | £120.06 | 4,680 | £122.07 | 2,764 | £123.29 |
| 2019 | 335,857 | £34,275,709 | 281,421 | £121.80 | 6,125 | £124.50 | 4,490 | £126.57 | 2,781 | £127.88 |
| 2020 | 339,002 | £34,322,550 | 291,156 | £117.88 | 6,333 | £120.50 | 4,818 | £122.58 | 3,084 | £123.94 |
| 2021 | 330,242 | £34,286,975 | 282,191 | £121.50 | 6,255 | £124.26 | 4,889 | £126.50 | 2,881 | £127.86 |
| 2022 | 328,910 | £34,283,183 | 289,385 | £118.47 | 5,486 | £120.76 | 4,228 | £122.58 | 2,655 | £123.76 |
| | | | | | | | | | | |
| SSBSSI | | | | | | | | | | |
| Payment rates with changed retention periods | | | | | | | | | | |
| year of birth | calf registrations | Total Budget | 410 Eligible | 410 rate | 60 Extra Ineligible | 410–60 rate | 90 Extra Ineligible | 410–90 rate | 120 Extra Ineligible | 410–120 rate |
| 2015 | 41,369 | £4,655,020 | 35,223 | £132.16 | 715 | £134.90 | 543 | £137.05 | 387 | £138.63 |
| 2016 | 39,237 | £5,614,245 | 33,031 | £169.97 | 589 | £173.06 | 415 | £175.30 | 363 | £177.31 |
| 2017 | 39,758 | £5,926,376 | 34,838 | £170.11 | 746 | £173.83 | 485 | £176.34 | 411 | £178.53 |
| 2018 | 39,337 | £5,901,984 | 34,884 | £169.19 | 702 | £172.66 | 445 | £174.94 | 392 | £177.00 |
| 2019 | 39,336 | £5,910,694 | 33,544 | £176.21 | 636 | £179.61 | 401 | £181.83 | 347 | £183.79 |
| 2020 | 39,885 | £5,911,325 | 35,222 | £167.83 | 610 | £170.79 | 439 | £172.98 | 377 | £174.91 |
| 2021 | 39,278 | £5,907,919 | 34,324 | £172.12 | 492 | £174.62 | 402 | £176.72 | 284 | £178.24 |
| 2022 | 39,865 | £5,914,454 | 35,532 | £166.45 | 477 | £168.72 | 419 | £170.76 | 328 | £172.39 |

Fertility – 410 day transitions

*Dropped dairy breeds

| | | 2023 | | | | | |
|------------|---------|--------|---------|---------|--------|------------|-----|
| | | Dead | No-calf | <=410 | >410 | 2022 Total | |
| 2022 | Heifer | 7,919 | 8,429 | 43,186 | 7,203 | 66,737 | 16% |
| | No-calf | 11,188 | 25,339 | 1,678 | 19,613 | 57,818 | 14% |
| | <=410 | 44,893 | 15,916 | 168,426 | 15,670 | 244,905 | 58% |
| | >410 | 12,698 | 7,677 | 27,987 | 4,505 | 52,867 | 13% |
| 2023 Total | | 76,698 | 57,361 | 241,277 | 46,991 | 422,327 | |

Denominator matters

| | | 2023 | | | | | |
|------------|---------|-------|---------|-------|-------|------------|--|
| | | Dead | No-calf | <=410 | >410 | 2022 Total | |
| 2022 | Heifer | 11.9% | 12.6% | 64.7% | 10.8% | 66,737 | |
| | No-calf | 19.4% | 43.8% | 2.9% | 33.9% | 57,818 | |
| | <=410 | 18.3% | 6.5% | 68.8% | 6.4% | 244,905 | |
| | >410 | 24.0% | 14.5% | 52.9% | 8.5% | 52,867 | |
| 2023 Total | | 18.2% | 13.6% | 57.1% | 11.1% | 422,327 | |

| | | 2023 | | | | |
|------------|---------|---------|-------|-------|------------|--|
| | | No-calf | <=410 | >410 | 2022 Total | |
| 2022 | Heifer | 14.3% | 73.4% | 12.2% | 58,818 | |
| | No-calf | 54.3% | 3.6% | 42.1% | 46,630 | |
| | <=410 | 8.0% | 84.2% | 7.8% | 200,012 | |
| | >410 | 19.1% | 69.7% | 11.2% | 40,169 | |
| 2023 Total | | 16.6% | 69.8% | 13.6% | 345,629 | |

Fertility – dam trends

Transition - head of cattle

| | | 2016 | | | | | |
|------|------------|--------|---------|---------|--------|------------|-----|
| | | Dead | No-calf | <=410 | >410 | 2015 Total | |
| 2015 | Heifer | 6,431 | 9,517 | 41,278 | 8,989 | 66,215 | 15% |
| | No-calf | 10,458 | 43,975 | 2,135 | 25,405 | 81,973 | 18% |
| | <=410 | 38,599 | 18,125 | 170,879 | 20,671 | 248,274 | 54% |
| | >410 | 12,516 | 9,079 | 31,458 | 6,598 | 59,651 | 13% |
| | 2016 Total | 68,004 | 80,696 | 245,750 | 61,663 | 456,113 | |

Reduced 'no calf'

| | | 2023 | | | | | |
|------|------------|--------|---------|---------|--------|------------|-----|
| | | Dead | No-calf | <=410 | >410 | 2022 Total | |
| 2022 | Heifer | 7,919 | 8,429 | 43,186 | 7,203 | 66,737 | 16% |
| | No-calf | 11,188 | 25,339 | 1,678 | 19,613 | 57,818 | 14% |
| | <=410 | 44,893 | 15,916 | 168,426 | 15,670 | 244,905 | 58% |
| | >410 | 12,698 | 7,677 | 27,987 | 4,505 | 52,867 | 13% |
| | 2023 Total | 76,698 | 57,361 | 241,277 | 46,991 | 422,327 | |

Transition - % of row total

| | | 2016 | | | | | |
|------|---------|-------|---------|-------|-------|------------|--|
| | | Dead | No-calf | <=410 | >410 | 2015 Total | |
| 2015 | Heifer | 9.7% | 14.4% | 62.3% | 13.6% | 66,215 | |
| | No-calf | 12.8% | 53.6% | 2.6% | 31.0% | 81,973 | |
| | <=410 | 15.5% | 7.3% | 68.8% | 8.3% | 248,274 | |
| | >410 | 21.0% | 15.2% | 52.7% | 11.1% | 59,651 | |
| | Total | 14.9% | 17.7% | 53.9% | 13.5% | 456,113 | |

Higher cull rates

| | | 2023 | | | | | |
|------|------------|-------|---------|-------|-------|------------|--|
| | | Dead | No-calf | <=410 | >410 | 2022 Total | |
| 2022 | Heifer | 11.9% | 12.6% | 64.7% | 10.8% | 66,737 | |
| | No-calf | 19.4% | 43.8% | 2.9% | 33.9% | 57,818 | |
| | <=410 | 18.3% | 6.5% | 68.8% | 6.4% | 244,905 | |
| | >410 | 24.0% | 14.5% | 52.9% | 8.5% | 52,867 | |
| | 2023 Total | 18.2% | 13.6% | 57.1% | 11.1% | 422,327 | |

Transition - Excluding animals that die in next year (% of row total)

| | | 2016 | | | | |
|------|---------|---------|-------|-------|------------|--|
| | | No-calf | <=410 | >410 | 2015 Total | |
| 2015 | Heifer | 15.9% | 69.0% | 15.0% | 59,784 | |
| | No-calf | 61.5% | 3.0% | 35.5% | 71,515 | |
| | <=410 | 8.6% | 81.5% | 9.9% | 209,675 | |
| | >410 | 19.3% | 66.7% | 14.0% | 47,135 | |
| | | | | | 388,109 | |

<410 perform best in n+1

| | | 2023 | | | | |
|------|------------|---------|-------|-------|------------|--|
| | | No-calf | <=410 | >410 | 2022 Total | |
| 2022 | Heifer | 14.3% | 73.4% | 12.2% | 58,818 | |
| | No-calf | 54.3% | 3.6% | 42.1% | 46,630 | |
| | <=410 | 8.0% | 84.2% | 7.8% | 200,012 | |
| | >410 | 19.1% | 69.7% | 11.2% | 40,169 | |
| | 2023 Total | 16.6% | 69.8% | 13.6% | 345,629 | |

Fertility – heifer age transitions

*Dropped dairy breeds

| | Heifer Age | 2023 | | | | 2022 Total | |
|------------|-------------|-------|---------|--------|-------|------------|-----|
| | | Dead | No-calf | <=410 | >410 | | |
| 2022 | Heifer <24m | 1,352 | 917 | 7,144 | 937 | 10,350 | 16% |
| | Heifer <30m | 2,689 | 2,529 | 14,787 | 1,998 | 22,003 | 33% |
| | Heifer <36m | 2,180 | 2,891 | 13,168 | 2,983 | 21,222 | 32% |
| | Heifer <42m | 1,132 | 1,305 | 5,918 | 811 | 9,166 | 14% |
| | Heifer <48m | 265 | 385 | 1,194 | 293 | 2,137 | 3% |
| | Heifer 48m+ | 301 | 402 | 975 | 181 | 1,859 | 3% |
| 2023 Total | | 7,919 | 8,429 | 43,186 | 7,203 | 66,737 | |

Denominator matters

| | Heifer Age | 2023 | | | | 2022 Total |
|------------|-------------|------|---------|-------|------|------------|
| | | Dead | No-calf | <=410 | >410 | |
| 2015 | Heifer <24m | 13% | 9% | 69% | 9% | 10,350 |
| | Heifer <30m | 12% | 11% | 67% | 9% | 22,003 |
| | Heifer <36m | 10% | 14% | 62% | 14% | 21,222 |
| | Heifer <42m | 12% | 14% | 65% | 9% | 9,166 |
| | Heifer <48m | 12% | 18% | 56% | 14% | 2,137 |
| | Heifer 48m+ | 16% | 22% | 52% | 10% | 1,859 |
| 2023 Total | | 12% | 13% | 65% | 11% | 66,737 |

| | Heifer Age | 2023 | | | 2022 Total |
|------------|-------------|---------|-------|------|------------|
| | | No-calf | <=410 | >410 | |
| 2015 | Heifer <24m | 10% | 79% | 10% | 8,998 |
| | Heifer <30m | 13% | 77% | 10% | 19,314 |
| | Heifer <36m | 15% | 69% | 16% | 19,042 |
| | Heifer <42m | 16% | 74% | 10% | 8,034 |
| | Heifer <48m | 21% | 64% | 16% | 1,872 |
| | Heifer 48m+ | 26% | 63% | 12% | 1,558 |
| 2023 Total | | 14% | 73% | 12% | 58,818 |

Fertility – heifer age trends

Transition - head of cattle

| | Heifer Age | 2016 | | | | 2015 Total | |
|------|-------------|-------|---------|--------|-------|------------|-----|
| | | Dead | No-calf | <=410 | >410 | | |
| 2015 | Heifer <24m | 962 | 929 | 5,180 | 1,082 | 8,153 | 12% |
| | Heifer <30m | 1,958 | 2,659 | 12,537 | 2,215 | 19,369 | 29% |
| | Heifer <36m | 1,855 | 3,302 | 13,605 | 3,788 | 22,550 | 34% |
| | Heifer <42m | 1,006 | 1,520 | 7,163 | 1,247 | 10,936 | 17% |
| | Heifer <48m | 320 | 544 | 1,530 | 390 | 2,784 | 4% |
| | Heifer 48m+ | 330 | 563 | 1,263 | 267 | 2,423 | 4% |
| | 2016 Total | 6,431 | 9,517 | 41,278 | 8,989 | 66,215 | |

More younger heifers

| | Heifer Age | 2023 | | | | 2022 Total | |
|------|-------------|-------|---------|--------|-------|------------|-----|
| | | Dead | No-calf | <=410 | >410 | | |
| 2022 | Heifer <24m | 1,352 | 917 | 7,144 | 937 | 10,350 | 16% |
| | Heifer <30m | 2,689 | 2,529 | 14,787 | 1,998 | 22,003 | 33% |
| | Heifer <36m | 2,180 | 2,891 | 13,168 | 2,983 | 21,222 | 32% |
| | Heifer <42m | 1,132 | 1,305 | 5,918 | 811 | 9,166 | 14% |
| | Heifer <48m | 265 | 385 | 1,194 | 293 | 2,137 | 3% |
| | Heifer 48m+ | 301 | 402 | 975 | 181 | 1,859 | 3% |
| | 2023 Total | 7,919 | 8,429 | 43,186 | 7,203 | 66,737 | |

Transition - % of row total

| | Heifer Age | 2016 | | | | 2015 Total | |
|------|-------------|------|---------|-------|------|------------|--|
| | | Dead | No-calf | <=410 | >410 | | |
| 2015 | Heifer <24m | 12% | 11% | 64% | 13% | 8,153 | |
| | Heifer <30m | 10% | 14% | 65% | 11% | 19,369 | |
| | Heifer <36m | 8% | 15% | 60% | 17% | 22,550 | |
| | Heifer <42m | 9% | 14% | 65% | 11% | 10,936 | |
| | Heifer <48m | 11% | 20% | 55% | 14% | 2,784 | |
| | Heifer 48m+ | 14% | 23% | 52% | 11% | 2,423 | |
| | 2016 Total | 10% | 14% | 62% | 14% | 66,215 | |

More younger heifers hit 410 CI in n+1

| | Heifer Age | 2023 | | | | 2022 Total | |
|------|-------------|------|---------|-------|------|------------|--|
| | | Dead | No-calf | <=410 | >410 | | |
| 2015 | Heifer <24m | 13% | 9% | 69% | 9% | 10,350 | |
| | Heifer <30m | 12% | 11% | 67% | 9% | 22,003 | |
| | Heifer <36m | 10% | 14% | 62% | 14% | 21,222 | |
| | Heifer <42m | 12% | 14% | 65% | 9% | 9,166 | |
| | Heifer <48m | 12% | 18% | 56% | 14% | 2,137 | |
| | Heifer 48m+ | 16% | 22% | 52% | 10% | 1,859 | |
| | 2023 Total | 12% | 13% | 65% | 11% | 66,737 | |

Transition - Excluding animals that die in next year (% of row total)

| | Heifer Age | 2016 | | | 2015 Total |
|------|-------------|---------|-------|------|------------|
| | | No-calf | <=410 | >410 | |
| 2015 | Heifer <24m | 13% | 72% | 15% | 7,191 |
| | Heifer <30m | 15% | 72% | 13% | 17,411 |
| | Heifer <36m | 16% | 66% | 18% | 20,695 |
| | Heifer <42m | 15% | 72% | 13% | 9,930 |
| | Heifer <48m | 22% | 62% | 16% | 2,464 |
| | Heifer 48m+ | 27% | 60% | 13% | 2,093 |
| | 2016 Total | 16% | 69% | 15% | 59,784 |

Older heifer most likely to have no calf in n+1

| | Heifer Age | 2023 | | | 2022 Total |
|------|-------------|---------|-------|------|------------|
| | | No-calf | <=410 | >410 | |
| 2015 | Heifer <24m | 10% | 79% | 10% | 8,998 |
| | Heifer <30m | 13% | 77% | 10% | 19,314 |
| | Heifer <36m | 15% | 69% | 16% | 19,042 |
| | Heifer <42m | 16% | 74% | 10% | 8,034 |
| | Heifer <48m | 21% | 64% | 16% | 1,872 |
| | Heifer 48m+ | 26% | 63% | 12% | 1,558 |
| | 2023 Total | 14% | 73% | 12% | 58,818 |

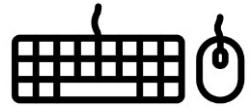
Acknowledgements

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SRUC

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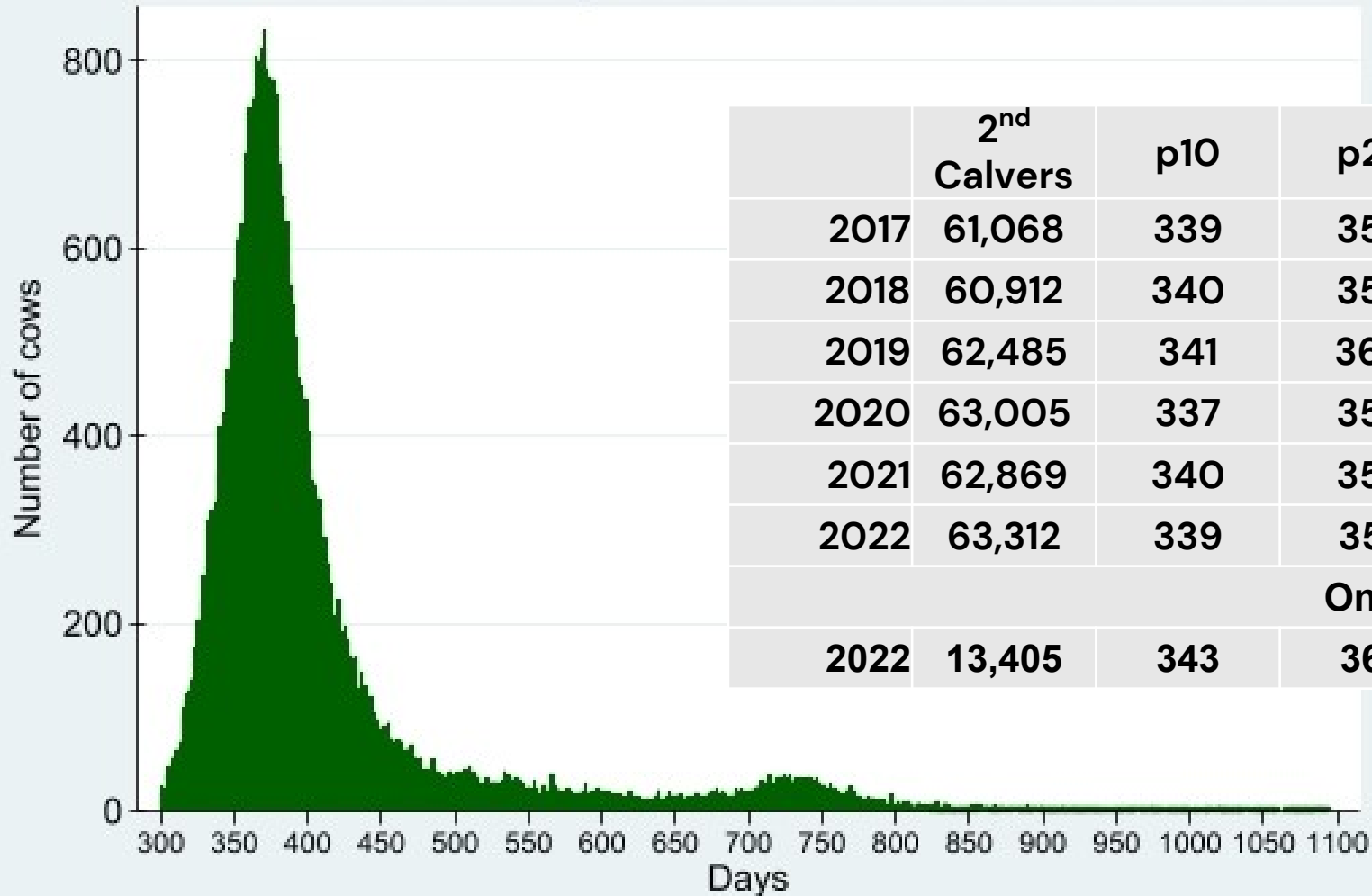


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**Thanks to the Scottish Government's
2022–2027 Strategic Research Programme for funding**

2nd Calvers – Beef Farm Types

Beef farms - Calving Intervals of Second Calvers 2021

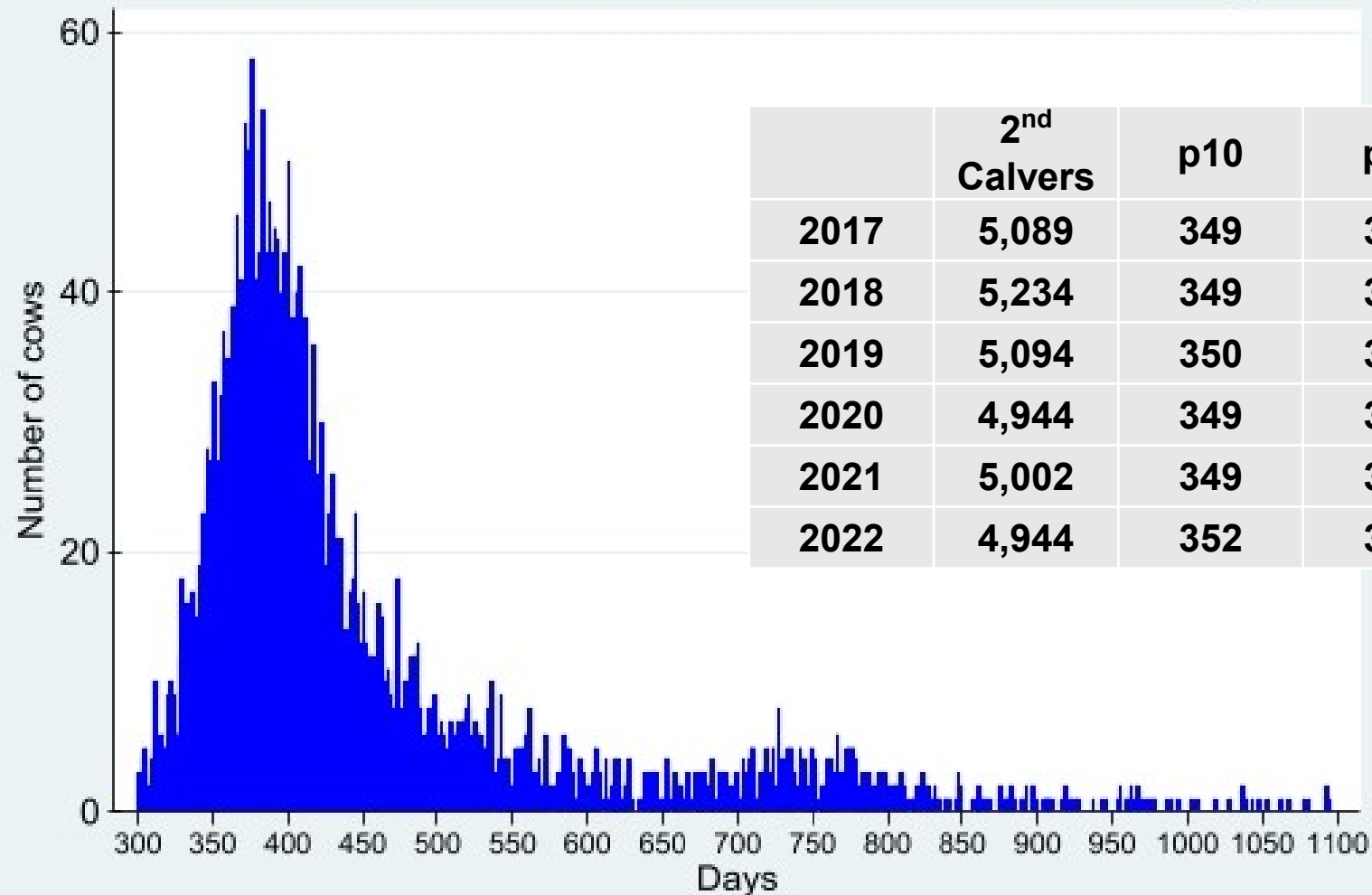


| | 2 nd Calvers | p10 | p25 | p50 | Mean | p75 | p90 |
|--------------|----------------------------|-----|-----|-----|------|-----|-----|
| 2017 | 61,068 | 339 | 358 | 380 | 413 | 419 | 539 |
| 2018 | 60,912 | 340 | 358 | 380 | 418 | 418 | 551 |
| 2019 | 62,485 | 341 | 360 | 382 | 426 | 425 | 585 |
| 2020 | 63,005 | 337 | 356 | 377 | 417 | 413 | 553 |
| 2021 | 62,869 | 340 | 358 | 379 | 416 | 414 | 538 |
| 2022 | 63,312 | 339 | 357 | 378 | 414 | 413 | 531 |
| On-Move Dams | | | | | | | |
| 2022 | 13,405 | 343 | 363 | 389 | 436 | 438 | 619 |

2nd Calvers on new holding – Beef Farm Types



Beef farms - CI of Second Calvers on differnt holding 2021



| | 2 nd Calvers | p10 | p25 | p50 | Mean | p75 | p90 |
|------|----------------------------|-----|-----|-----|------|-----|-----|
| 2017 | 5,089 | 349 | 371 | 402 | 442 | 461 | 608 |
| 2018 | 5,234 | 349 | 370 | 399 | 447 | 456 | 656 |
| 2019 | 5,094 | 350 | 371 | 402 | 457 | 463 | 670 |
| 2020 | 4,944 | 349 | 369 | 397 | 451 | 448 | 664 |
| 2021 | 5,002 | 349 | 371 | 400 | 452 | 458 | 644 |
| 2022 | 4,944 | 352 | 373 | 400 | 447 | 452 | 630 |