**Supplementary Table S2** *Weather models compared (filled circles) using maximum likelihood and AIC*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | term | Ts (PS) | THI1 (PS) | THI2 (PS) | Tdb (PS) | Tdb (C) | Twb (PS) | Tg (C) | WS (PS) | PMSL (PS) | RH (PS) | visibility (PS) | sun (C) | snow (PS) | ppt (PS) |
| TD | L | ● | ● | ● | ● | ○ | ● | ○ | ● | ● | ● | ● | ● | ● | ● |
|  | Q | ● | ● | ● | ● | ○ | ● | ○ | ● | ● | ● | ○ | ● | ○ | ○ |
|  | C | ● | ● | ● | ● | ○ | ● | ○ | ● | ● | ● | ○ | ● | ○ | ○ |
| TD -1 | L | ● | ● | ● | ● | ○ | ● | ○ | ● | ● | ● | ● | ● | ● | ● |
|  | Q | ● | ● | ● | ● | ○ | ● | ○ | ● | ● | ● | ○ | ● | ○ | ○ |
|  | C | ● | ● | ● | ● | ○ | ● | ○ | ● | ● | ● | ○ | ● | ○ | ○ |
| TD-2 | L | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ● | ○ | ○ |
|  | Q | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ● | ○ | ○ |
|  | C | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ● | ○ | ○ |
| TD minimum | L | ○ | ○ | ○ | ○ | ● | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
|  | Q | ○ | ○ | ○ | ○ | ● | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
|  | C | ○ | ○ | ○ | ○ | ● | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| TD-1 minimum | L | ○ | ○ | ○ | ○ | ● | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
|  | Q | ○ | ○ | ○ | ○ | ● | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
|  | C | ○ | ○ | ○ | ○ | ● | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| TD maximum | L | ○ | ○ | ○ | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
|  | Q | ○ | ○ | ○ | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
|  | C | ○ | ○ | ○ | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| TD-1 maximum | L | ○ | ○ | ○ | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
|  | Q | ○ | ○ | ○ | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
|  | C | ○ | ○ | ○ | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| TD presence/absence | L | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ● | ○ |
| TD-1 presence/absence | L | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ● | ○ |
| 3 day mean | L | ● | ● | ● | ● | ○ | ● | ○ | ● | ● | ● | ● | ● | ● | ● |
|  | Q | ● | ● | ● | ● | ○ | ● | ○ | ● | ● | ● | ○ | ● | ○ | ○ |
|  | C | ● | ● | ● | ● | ○ | ● | ○ | ● | ● | ● | ○ | ● | ○ | ○ |
| Weekly mean | L | ● | ● | ● | ● | ○ | ● | ○ | ● | ● | ● | ● | ● | ● | ● |
|  | Q | ● | ● | ● | ● | ○ | ● | ○ | ● | ● | ● | ○ | ● | ○ | ○ |
|  | C | ● | ● | ● | ● | ○ | ● | ○ | ● | ● | ● | ○ | ● | ○ | ○ |
| 3 day minimum | L | ○ | ○ | ○ | ○ | ● | ○ | ● | ○ | ○ | ○ | ○ | ● | ● | ● |
|  | Q | ○ | ○ | ○ | ○ | ● | ○ | ● | ○ | ○ | ○ | ○ | ● | ○ | ○ |
|  | C | ○ | ○ | ○ | ○ | ● | ○ | ● | ○ | ○ | ○ | ○ | ● | ○ | ○ |
| Weekly minimum | L | ○ | ○ | ○ | ○ | ● | ○ | ● | ○ | ○ | ○ | ○ | ● | ● | ● |
|  | Q | ○ | ○ | ○ | ○ | ● | ○ | ● | ○ | ○ | ○ | ○ | ● | ○ | ○ |
|  | C | ○ | ○ | ○ | ○ | ● | ○ | ● | ○ | ○ | ○ | ○ | ● | ○ | ○ |
| 3 day maximum | L | ○ | ○ | ○ | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● | ● |
|  | Q | ○ | ○ | ○ | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ● | ○ | ○ |
|  | C | ○ | ○ | ○ | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ● | ○ | ○ |
| Weekly maximum | L | ○ | ○ | ○ | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● | ● |
|  | Q | ○ | ○ | ○ | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ● | ○ | ○ |
|  | C | ○ | ○ | ○ | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | ● | ○ | ○ |
| **No. models compared per milk trait** |  | 36 | 36 | 36 | 36 | 72 | 36 | 36 | 36 | 36 | 36 | 8 | 81 | 20 | 16 |

Abbreviations of weather elements are given in Table 1. Each model (*N* = 521 per milk trait) contained a single weather metric or weather metric × management interaction and controlled for all terms in Equation 3. Linear (‘L’), quadratic (‘Q’) and cubic (‘C’) terms were fitted to main effects of weather metrics and their interactions with management. Model comparisons were subject to the availability of data, whether the weather metric was continuous or categorical, sampling method and the nature of the hypothesis. Data were point-sampled each day at 0900 h (‘PS’) or measured continuously across 24h (‘C’). For Tdb, data collected using both methods were available, allowing comparison of models based on PS and C summaries. TD indicates the test day; TD-n is n days before milking.