

**Table S1. Detailed information of sampled data on ENA/EVA.**

| ENA ACCESSION | Secondary Accession | ENA ID      | OPTIBOV ID             | BREED                | COUNTRY | GPS                  | SEX | YCF ID  | Front | Back | Body size | Body | Weight | Colour             | Horns  | Milk production |
|---------------|---------------------|-------------|------------------------|----------------------|---------|----------------------|-----|---------|-------|------|-----------|------|--------|--------------------|--------|-----------------|
| PRJEB90816    | ERP173822           | ERS25067511 | Western Finn cattle1   | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN1  | -     | 127  | 186       | 38.3 | -      | light brown        | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067520 | Western Finn cattle10  | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN10 | -     | 137  | 208       | 38.7 | -      | very light brown   | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067521 | Western Finn cattle11  | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN11 | -     | 131  | 193       | 38.5 | -      | light brown        | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067522 | Western Finn cattle12  | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN12 | -     | 135  | 212       | 38.6 | -      | light brown        | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067523 | Western Finn cattle13  | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN13 | -     | 133  | 193       | 38.7 | -      | (very) light brown | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067524 | Western Finn cattle14  | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN14 | -     | 139  | 197       | 38.6 | -      | light brown        | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067525 | Western Finn cattle15  | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN15 | -     | 134  | 197       | 38.9 | -      | light brown        | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067526 | Western Finn cattle16  | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN16 | -     | 133  | 195       | 38.5 | -      | light brown, wh    | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067527 | Western Finn cattle17  | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN17 | -     | 128  | 197       | 38.4 | -      | light brown, wh    | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067528 | Western Finn cattle18  | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN18 | -     | 137  | 199       | 38.2 | -      | light brown        | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067529 | Western Finn cattle19  | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN19 | -     | 135  | 188       | 38.3 | -      | light brown        | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067512 | Western Finn cattle2   | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN2  | -     | 134  | 199       | 38.3 | -      | light brown        | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067530 | Western Finn cattle20  | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN20 | -     | 129  | 186       | 38.6 | -      | light brown        | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067531 | Western Finn cattle21  | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN21 | -     | 134  | 184       | 38.7 | -      | light brown        | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067532 | Western Finn cattle22  | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN22 | -     | 126  | 196       | 38.5 | -      | light brown        | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067533 | Western Finn cattle23  | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN23 | -     | 131  | 175       | 38.7 | -      | light brown        | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067534 | Western Finn cattle24  | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN24 | -     | 143  | 192       | 38.7 | -      | light brown        | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067535 | Western Finn cattle25  | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN25 | -     | 135  | 198       | 38.7 | -      | light brown        | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067513 | Western Finn cattle3   | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN3  | -     | 124  | 170       | 38.7 | -      | light brown        | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067514 | Western Finn cattle4   | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN4  | -     | 137  | 199       | 38.7 | -      | light brown, wh    | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067515 | Western Finn cattle5   | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN5  | -     | 140  | 210       | 38.7 | -      | light brown        | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067516 | Western Finn cattle6   | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN6  | -     | 135  | 191       | 38.6 | -      | light brown        | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067517 | Western Finn cattle7   | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN7  | -     | 137  | 194       | 38.6 | -      | light brown        | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067518 | Western Finn cattle8   | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN8  | -     | 137  | 198       | 38   | -      | light brown        | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067519 | Western Finn cattle9   | Western Finn cattle  | FINLAND | 61.470733, 23.806264 | F   | a1FIN9  | -     | 138  | 197       | 38.7 | -      | light brown        | polled | 7506 kg         |
| PRJEB90816    | ERP173822           | ERS25067536 | Northern Finn cattle1  | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN1  | -     | 127  | 189       | 38.7 | -      | white, red sided   | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067545 | Northern Finn cattle10 | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN10 | -     | 122  | 186       | 38.5 | -      | white              | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067546 | Northern Finn cattle11 | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN11 | -     | 120  | 166       | 38.7 | -      | white              | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067547 | Northern Finn cattle12 | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN12 | -     | 121  | 176       | 38.8 | -      | white, red spec    | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067548 | Northern Finn cattle13 | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN13 | -     | 133  | 188       | 38.6 | -      | white, black ear   | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067549 | Northern Finn cattle14 | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN14 | -     | 125  | 188       | 38.8 | -      | white, brown ear   | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067550 | Northern Finn cattle15 | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN15 | -     | 128  | 180       | 38.3 | -      | white, brown ear   | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067551 | Northern Finn cattle16 | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN16 | -     | 126  | 180       | 38.6 | -      | white, black mu    | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067552 | Northern Finn cattle17 | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN17 | -     | 134  | 190       | 38.7 | -      | white              | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067553 | Northern Finn cattle18 | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN18 | -     | 132  | 190       | 38.6 | -      | white, black spe   | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067554 | Northern Finn cattle19 | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN19 | -     | 123  | 180       | 38.5 | -      | white, red spec    | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067537 | Northern Finn cattle2  | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN2  | -     | 120  | 178       | 38.5 | -      | white, black sid   | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067555 | Northern Finn cattle20 | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN20 | -     | 117  | 171       | 38.3 | -      | white              | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067556 | Northern Finn cattle21 | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN21 | -     | 119  | 189       | 38.8 | -      | white, brown ear   | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067557 | Northern Finn cattle22 | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN22 | -     | 127  | 193       | 38.7 | -      | white, black spe   | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067558 | Northern Finn cattle23 | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN23 | -     | 128  | 189       | 38.8 | -      | white, black ear   | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067559 | Northern Finn cattle24 | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN24 | -     | 125  | 188       | 38.6 | -      | white, brown ear   | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067560 | Northern Finn cattle25 | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN25 | -     | 126  | 180       | 38.7 | -      | white, brown ear   | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067538 | Northern Finn cattle3  | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN3  | -     | 123  | 175       | 38.3 | -      | white, brown ear   | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067539 | Northern Finn cattle4  | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN4  | -     | 123  | 194       | 38.6 | -      | white, red sided   | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067540 | Northern Finn cattle5  | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN5  | -     | 127  | 189       | 38.7 | -      | white, brown ear   | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067541 | Northern Finn cattle6  | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN6  | -     | 122  | 184       | 38.5 | -      | white, brown ear   | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067542 | Northern Finn cattle7  | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN7  | -     | 128  | 188       | 38.7 | -      | white, brown ear   | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067543 | Northern Finn cattle8  | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN8  | -     | 121  | 179       | 38.5 | -      | white              | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067544 | Northern Finn cattle9  | Northern Finn cattle | FINLAND | 64.500346, 26.433493 | F   | a2FIN9  | -     | 127  | 189       | 38.7 | -      | white, black ear   | polled | 4058 kg         |
| PRJEB90816    | ERP173822           | ERS25067486 | Eastern Finn cattle1   | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN1  | -     | 127  | 188       | 38.7 | -      | red sided (flank)  | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067495 | Eastern Finn cattle10  | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN10 | -     | 125  | 186       | 38.6 | -      | red sided (flank)  | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067496 | Eastern Finn cattle11  | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN11 | -     | 123  | 177       | 38.6 | -      | red and white      | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067497 | Eastern Finn cattle12  | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN12 | -     | 121  | 191       | 38.9 | -      | dark brown side    | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067498 | Eastern Finn cattle13  | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN13 | -     | 123  | 198       | 38.6 | -      | dark brown side    | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067499 | Eastern Finn cattle14  | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN14 | -     | 127  | 204       | 38.5 | -      | brown, white ma    | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067500 | Eastern Finn cattle15  | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN15 | -     | 124  | 185       | 38.7 | -      | red sided (flank)  | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067501 | Eastern Finn cattle16  | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN16 | -     | 124  | 187       | 38.5 | -      | red sided (flank)  | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067502 | Eastern Finn cattle17  | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN17 | -     | 118  | 194       | 38.6 | -      | red sided (flank)  | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067503 | Eastern Finn cattle18  | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN18 | -     | 118  | 179       | 38.5 | -      | red sided (flank)  | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067504 | Eastern Finn cattle19  | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN19 | -     | 124  | 194       | 39.1 | -      | red sided (flank)  | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067487 | Eastern Finn cattle2   | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN2  | -     | 126  | 189       | 39.1 | -      | red sided (flank)  | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067505 | Eastern Finn cattle20  | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN20 | -     | 121  | 203       | 38.7 | -      | red sided (flank)  | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067506 | Eastern Finn cattle21  | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN21 | -     | 120  | 176       | 38.6 | -      | red sided (flank)  | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067507 | Eastern Finn cattle22  | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN22 | -     | 133  | 202       | 38.6 | -      | red speckled (th   | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067508 | Eastern Finn cattle23  | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN23 | -     | 118  | 180       | 38.7 | -      | slightly red spec  | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067509 | Eastern Finn cattle24  | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN24 | -     | 137  | 200       | 38.7 | -      | brown              | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067510 | Eastern Finn cattle25  | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN25 | -     | 131  | 201       | 38.7 | -      | red speckled (th   | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067488 | Eastern Finn cattle3   | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN3  | -     | 123  | 188       | 38.7 | -      | red sided (flank)  | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067489 | Eastern Finn cattle4   | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN4  | -     | 120  | 189       | 38.8 | -      | red sided (flank)  | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067490 | Eastern Finn cattle5   | Eastern Finn cattle  | FINLAND | 64.253241, 27.735706 | F   | a3FIN5  | -     | 122  | 193       | 38.7 | -      | red sided (flank)  | polled | 4100 kg         |
| PRJEB90816    | ERP173822           | ERS25067491 | Eastern Finn cattle6   | Eastern Finn cattle  | FINLAND | 64.253241, 27.7      |     |         |       |      |           |      |        |                    |        |                 |

|            |           |             |                          |                    |            |                 |   |           |     |     |      |   |                 |     |   |
|------------|-----------|-------------|--------------------------|--------------------|------------|-----------------|---|-----------|-----|-----|------|---|-----------------|-----|---|
| PRJEB90816 | ERP173822 | ERS25067667 | MRY10                    | Meuse-Rhine-Issel  | THE NETHER | 51,6703, 5,4477 | F | NL5443676 | 142 | 220 | 38.6 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067642 | Groningen White Headed1  | Groningen White He | THE NETHER | 53,1796, 6,4586 | F | NL5461415 | 133 | 196 | 38.7 | - | whiteheaded-bla | -   | - |
| PRJEB90816 | ERP173822 | ERS25067618 | Dutch Friesian11         | Dutch Friesian     | THE NETHER | 52,0754, 5,5071 | F | NL5462738 | 140 | 212 | 38.8 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067673 | MRY16                    | Meuse-Rhine-Issel  | THE NETHER | 51,8708, 5,5870 | M | NL5473130 | 108 | 135 | 38.9 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067564 | Deep Red4                | Deep Red           | THE NETHER | 52,6895, 6,7483 | F | NL5697576 | 132 | 191 | 39.1 | - | deep red        | -   | - |
| PRJEB90816 | ERP173822 | ERS25067565 | Deep Red5                | Deep Red           | THE NETHER | 52,0545, 5,6568 | F | NL5697577 | 124 | 187 | 39.1 | - | deep red        | -   | - |
| PRJEB90816 | ERP173822 | ERS25067668 | MRY11                    | Meuse-Rhine-Issel  | THE NETHER | 51,8708, 5,5870 | F | NL5873747 | 136 | 203 | 38.6 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067619 | Dutch Friesian12         | Dutch Friesian     | THE NETHER | 52,9715, 5,8356 | F | NL5924722 | 142 | 198 | 38.3 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067643 | Groningen White Headed12 | Groningen White He | THE NETHER | 53,1796, 6,4586 | F | NL6185002 | 136 | 189 | 38.6 | - | whiteheaded-red | -   | - |
| PRJEB90816 | ERP173822 | ERS25067675 | MRY18                    | Meuse-Rhine-Issel  | THE NETHER | 51,7858, 5,5257 | M | NL6201136 | 129 | 181 | 39.3 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067676 | MRY19                    | Meuse-Rhine-Issel  | THE NETHER | 51,8708, 5,5870 | M | NL6201137 | 125 | 171 | 39.3 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067678 | MRY21                    | Meuse-Rhine-Issel  | THE NETHER | 51,6716, 5,3796 | M | NL6267122 | 150 | 216 | 38.7 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067620 | Dutch Friesian13         | Dutch Friesian     | THE NETHER | 53,2501, 5,8536 | F | NL6275834 | 138 | 195 | 38.9 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067621 | Dutch Friesian14         | Dutch Friesian     | THE NETHER | 52,1301, 5,4850 | F | NL6326215 | 142 | 194 | 39.4 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067622 | Dutch Friesian15         | Dutch Friesian     | THE NETHER | 52,0754, 5,5071 | F | NL6326216 | 143 | 220 | 38.6 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067623 | Dutch Friesian16         | Dutch Friesian     | THE NETHER | 52,9715, 5,8356 | F | NL6326216 | 143 | 207 | 38.7 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067624 | Dutch Friesian17         | Dutch Friesian     | THE NETHER | 53,2501, 5,8536 | F | NL6374036 | 134 | 201 | 38.5 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067679 | MRY22                    | Meuse-Rhine-Issel  | THE NETHER | 51,6716, 5,3796 | M | NL6389767 | 129 | 179 | 38.9 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067660 | MRY3                     | Meuse-Rhine-Issel  | THE NETHER | 51,7858, 5,5257 | M | NL6389767 | 130 | 181 | 38.8 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067625 | Dutch Friesian18         | Dutch Friesian     | THE NETHER | 52,1301, 5,4850 | F | NL6400092 | 105 | ND  | 38.7 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067626 | Dutch Friesian19         | Dutch Friesian     | THE NETHER | 53,2501, 5,8536 | F | NL6434094 | ND  | ND  | 39.2 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067648 | Groningen White Headed17 | Groningen White He | THE NETHER | 52,3267, 6,0384 | M | NL6451473 | 107 | 139 | 38.8 | - | whiteheaded-bla | -   | - |
| PRJEB90816 | ERP173822 | ERS25067604 | Dutch belted20           | Dutch belted       | THE NETHER | 52,9687, 6,2300 | F | NL6476775 | 135 | 210 | 38.8 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067644 | Groningen White Headed13 | Groningen White He | THE NETHER | 53,1796, 6,4586 | F | NL6551248 | 131 | 207 | 39   | - | whiteheaded-red | -   | - |
| PRJEB90816 | ERP173822 | ERS25067645 | Groningen White Headed14 | Groningen White He | THE NETHER | 53,1304, 6,4265 | F | NL6569140 | 132 | 190 | 39.1 | - | whiteheaded-bla | -   | - |
| PRJEB90816 | ERP173822 | ERS25067646 | Groningen White Headed15 | Groningen White He | THE NETHER |                 | F | NL6569141 | 129 | 189 | 39   | - | whiteheaded-bla | -   | - |
| PRJEB90816 | ERP173822 | ERS25067647 | Groningen White Headed16 | Groningen White He | THE NETHER | 52,2168, 4,5247 | F | NL6607131 | 132 | 190 | 39.1 | - | whiteheaded-bla | -   | - |
| PRJEB90816 | ERP173822 | ERS25067605 | Dutch belted21           | Dutch belted       | THE NETHER | 52,9687, 6,2300 | F | NL6609431 | 126 | 178 | 39   | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067606 | Dutch belted22           | Dutch belted       | THE NETHER | 53,1304, 6,4265 | F | NL6622003 | 142 | 210 | 38.8 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067633 | Groningen White Headed2  | Groningen White He | THE NETHER | 52,3267, 6,0384 | F | NL6624451 | 128 | 191 | 38.8 | - | whiteheaded-red | -   | - |
| PRJEB90816 | ERP173822 | ERS25067566 | Deep Red6                | Deep Red           | THE NETHER | 51,6315, 5,9498 | M | NL6626001 | 141 | 218 | 38.8 | - | deep red        | -   | - |
| PRJEB90816 | ERP173822 | ERS25067534 | Groningen White Headed3  | Groningen White He | THE NETHER | 52,3267, 6,0384 | F | NL6628200 | 134 | 209 | 38.8 | - | whiteheaded-bla | -   | - |
| PRJEB90816 | ERP173822 | ERS25067567 | Deep Red7                | Deep Red           | THE NETHER | 52,0545, 5,6568 | F | NL6628217 | 133 | 213 | 38.7 | - | deep red        | -   | - |
| PRJEB90816 | ERP173822 | ERS25067568 | Deep Red8                | Deep Red           | THE NETHER | 51,6315, 5,9498 | F | NL6636293 | 128 | 185 | 39.3 | - | deep red        | -   | - |
| PRJEB90816 | ERP173822 | ERS25067653 | Holstein Friesian1       | Holstein Friesian  | THE NETHER | 51,9367, 5,7392 | F | NL6697139 | 147 | 212 | 37.7 | - | black and white | -   | - |
| PRJEB90816 | ERP173822 | ERS25067635 | Groningen White Headed4  | Groningen White He | THE NETHER | 51,9974, 5,6204 | M | NL6789217 | 132 | 205 | 38.9 | - | whiteheaded-bla | -   | - |
| PRJEB90816 | ERP173822 | ERS25067607 | Dutch belted23           | Dutch belted       | THE NETHER | 53,0535, 6,4331 | M | NL6852005 | 128 | 171 | 39.3 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067569 | Deep Red9                | Deep Red           | THE NETHER | 52,0545, 5,6568 | F | NL6871303 | 130 | 188 | 38.5 | - | deep red        | -   | - |
| PRJEB90816 | ERP173822 | ERS25067661 | MRY4                     | Meuse-Rhine-Issel  | THE NETHER | 51,7858, 5,5257 | M | NL6877947 | 137 | 193 | 38.2 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067609 | Dutch Friesian2          | Dutch Friesian     | THE NETHER | 52,1301, 5,4850 | F | NL6986827 | 131 | 194 | 38.9 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067570 | Deep Red10               | Deep Red           | THE NETHER | 52,2599, 6,2522 | F | NL6998430 | 127 | 192 | 38.7 | - | deep red        | -   | - |
| PRJEB90816 | ERP173822 | ERS25067597 | Dutch belted13           | Dutch belted       | THE NETHER | 53,1304, 6,4265 | F | NL7093016 | 127 | 182 | 38.9 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067574 | Dutch belted14           | Dutch belted       | THE NETHER | 53,1304, 6,4265 | F | NL7104516 | 131 | 189 | 38.9 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067571 | Deep Red11               | Deep Red           | THE NETHER | 52,2599, 6,2522 | F | NL7118270 | 132 | 200 | 38.8 | - | deep red        | -   | - |
| PRJEB90816 | ERP173822 | ERS25067669 | MRY12                    | Meuse-Rhine-Issel  | THE NETHER | 51,8708, 5,5870 | F | NL7151732 | 136 | 214 | 38.5 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067636 | Groningen White Headed5  | Groningen White He | THE NETHER | 51,9974, 5,6204 | F | NL7177441 | 138 | 193 | 38.7 | - | whiteheaded-bla | -   | - |
| PRJEB90816 | ERP173822 | ERS25067670 | MRY13                    | Meuse-Rhine-Issel  | THE NETHER | 51,7858, 5,5257 | F | NL7226928 | 136 | 199 | 38.5 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067671 | MRY14                    | Meuse-Rhine-Issel  | THE NETHER | 51,6703, 5,4477 | F | NL7226929 | 136 | 207 | 38.5 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067649 | Groningen White Headed18 | Groningen White He | THE NETHER | 53,2127, 6,4025 | M | NL7244844 | 140 | 214 | 39   | - | whiteheaded-red | -   | - |
| PRJEB90816 | ERP173822 | ERS25067627 | Dutch Friesian20         | Dutch Friesian     | THE NETHER | 53,2501, 5,8536 | F | NL7246754 | 133 | 212 | 38.7 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067637 | Groningen White Headed6  | Groningen White He | THE NETHER | 51,9974, 5,6204 | F | NL7307212 | 136 | 190 | 38.6 | - | whiteheaded-red | -   | - |
| PRJEB90816 | ERP173822 | ERS25067572 | Deep Red12               | Deep Red           | THE NETHER | 52,2599, 6,2522 | M | NL7313278 | 134 | 201 | 38.5 | - | deep red        | -   | - |
| PRJEB90816 | ERP173822 | ERS25067573 | Deep Red13               | Deep Red           | THE NETHER | 52,0545, 5,6568 | F | NL7313281 | 136 | 198 | 38.8 | - | deep red        | -   | - |
| PRJEB90816 | ERP173822 | ERS25067599 | Dutch belted15           | Dutch belted       | THE NETHER | 53,1169, 6,5317 | F | NL7320496 | 127 | 172 | 38.5 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067672 | MRY15                    | Meuse-Rhine-Issel  | THE NETHER | 51,6703, 5,4477 | F | NL7384080 | 138 | 197 | 38.6 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067654 | Holstein Friesian2       | Holstein Friesian  | THE NETHER | 51,9367, 5,7392 | F | NL7418102 | 146 | 192 | 38.7 | - | black and white | -   | - |
| PRJEB90816 | ERP173822 | ERS25067603 | Dutch belted19           | Dutch belted       | THE NETHER | 52,2541, 6,3727 | M | NL7418783 | 117 | 161 | 38.5 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067587 | Dutch belted3            | Dutch belted       | THE NETHER | 51,8753, 6,1416 | F | NL7425776 | 131 | 210 | 37.8 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067588 | Dutch belted4            | Dutch belted       | THE NETHER | 52,2541, 6,3727 | F | NL7426885 | 131 | 208 | 38.5 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067589 | Dutch belted5            | Dutch belted       | THE NETHER | 52,2541, 6,3727 | M | NL7528017 | 130 | 203 | 38.9 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067574 | Deep Red14               | Deep Red           | THE NETHER | 52,2599, 6,2522 | F | NL7531435 | 125 | 188 | 38.4 | - | deep red        | -   | - |
| PRJEB90816 | ERP173822 | ERS25067590 | Dutch belted6            | Dutch belted       | THE NETHER | 52,2541, 6,3727 | F | NL7544520 | 129 | 187 | 38.8 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067628 | Dutch Friesian21         | Dutch Friesian     | THE NETHER | 53,2501, 5,8536 | F | NL7577157 | 142 | 220 | 38.5 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067629 | Dutch Friesian22         | Dutch Friesian     | THE NETHER | 52,0754, 5,5071 | F | NL7577158 | 146 | 199 | 38.8 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067630 | Dutch Friesian23         | Dutch Friesian     | THE NETHER | 52,9715, 5,8356 | F | NL7593019 | 142 | 212 | 38.4 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067575 | Deep Red15               | Deep Red           | THE NETHER | 52,2599, 6,2522 | F | NL7607210 | 133 | 208 | 39.1 | - | deep red        | -   | - |
| PRJEB90816 | ERP173822 | ERS25067591 | Dutch belted7            | Dutch belted       | THE NETHER | 52,9687, 6,2300 | F | NL7613018 | 130 | 207 | 39   | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067674 | MRY17                    | Meuse-Rhine-Issel  | THE NETHER | 51,7858, 5,5257 | F | NL7619723 | 135 | 202 | 38.7 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067576 | Deep Red16               | Deep Red           | THE NETHER | 51,6315, 5,9498 | F | NL7640432 | 131 | 190 | 38.5 | - | deep red        | -   | - |
| PRJEB90816 | ERP173822 | ERS25067592 | Dutch belted8            | Dutch belted       | THE NETHER | 52,9687, 6,2300 | M | NL7645181 | 132 | 188 | 39   | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067631 | Dutch Friesian24         | Dutch Friesian     | THE NETHER | 52,9715, 5,8356 | F | NL7653770 | 133 | 202 | 39   | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067610 | Dutch Friesian3          | Dutch Friesian     | THE NETHER | 52,9715, 5,8356 | F | NL7657160 | 140 | 197 | 38.8 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067593 | Dutch belted9            | Dutch belted       | THE NETHER | 52,8961, 6,2257 | M | NL7670888 | 127 | 192 | 38   | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067659 | MRY2                     | Meuse-Rhine-Issel  | THE NETHER | 51,7858, 5,5257 | F | NL7678093 | 141 | 217 | 38.7 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067677 | MRY20                    | Meuse-Rhine-Issel  | THE NETHER | 51,6716, 5,3796 | F | NL8444589 | 139 | 215 | 38.6 | - | red-white       | -   | - |
| PRJEB90816 | ERP173822 | ERS25067611 | Dutch Friesian4          | Dutch Friesian     | THE NETHER | 52,1301, 5,4850 | F | NL8445789 | 136 | 194 | 38.7 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067577 | Deep Red17               | Deep Red           | THE NETHER | 52,6895, 6,7483 | F | NL8446575 | 133 | 189 | 38.8 | - | deep red        | -   | - |
| PRJEB90816 | ERP173822 | ERS25067612 | Dutch Friesian5          | Dutch Friesian     | THE NETHER | 52,1301, 5,4850 | F | NL8656028 | 141 | 203 | 38.5 | - | black-white     | -   | - |
| PRJEB90816 | ERP173822 | ERS25067650 | Groningen White Headed19 | Groningen White He | THE NETHER | 53,1796, 6,4586 | M | NL8676122 | 141 | 198 | 38.7 | - | whiteheaded-bla | -   | - |
| PRJEB90816 | ERP173822 | ERS25067578 | Deep Red18               | Deep Red           | THE NETHER | 52,6895, 6,7483 | M | NL8686483 | 133 | 224 | 38.5 | - | deep red        | -</ |   |

|            |           |             |                         |                        |            |                      |   |           |       |       |        |       |                 |                 |   |   |
|------------|-----------|-------------|-------------------------|------------------------|------------|----------------------|---|-----------|-------|-------|--------|-------|-----------------|-----------------|---|---|
| PRJEB90816 | ERP173822 | ERS25067664 | MRY7                    | Meuse-Rhine-Issel      | THE NETHER | 51.8708, 5.5870      | F | NL9246936 | 142   | 192   | 38.6   | -     | red-white       | -               | - |   |
| PRJEB90816 | ERP173822 | ERS25067665 | MRY8                    | Meuse-Rhine-Issel      | THE NETHER | 51.7858, 5.5257      | F | NL9246936 | 132   | 193   | 38.4   | -     | red-white       | -               | - |   |
| PRJEB90816 | ERP173822 | ERS25067581 | Deep_Red21              | Deep_Red               | THE NETHER | 52.6895, 6.7483      | F | NL9253571 | 134   | 210   | 39.2   | -     | deep red        | -               | - |   |
| PRJEB90816 | ERP173822 | ERS25067582 | Deep_Red22              | Deep_Red               | THE NETHER | 51.6315, 5.9498      | F | NL9295573 | 133   | 211   | 39.1   | -     | deep red        | -               | - |   |
| PRJEB90816 | ERP173822 | ERS25067583 | Deep_Red23              | Deep_Red               | THE NETHER | 52.2599, 6.2522      | F | NL9295575 | 131   | 200   | 39     | -     | deep red        | -               | - |   |
| PRJEB90816 | ERP173822 | ERS25067639 | Groningen White Headed8 | Groningen White Headed | THE NETHER | 53.2127, 6.4025      | F | NL9332425 | 140   | 215   | 38.6   | -     | whiteheaded-red | -               | - |   |
| PRJEB90816 | ERP173822 | ERS25067586 | Dutch_belted2           | Dutch_belted           | THE NETHER | 51.8753, 6.1416      | F | NL9382781 | 125   | 180   | 38.5   | -     | black-white     | -               | - |   |
| PRJEB90816 | ERP173822 | ERS25067657 | Holstein Friesian5      | Holstein Friesian      | THE NETHER | 51.9367, 5.7392      | F | NL9388867 | 152   | 201   | 38.3   | -     | black and white | -               | - |   |
| PRJEB90816 | ERP173822 | ERS25067666 | MRY9                    | Meuse-Rhine-Issel      | THE NETHER | 51.6716, 5.3796      | M | NL9391121 | 108   | 147   | 39.2   | -     | red-white       | -               | - |   |
| PRJEB90816 | ERP173822 | ERS25067616 | Dutch Friesian9         | Dutch Friesian         | THE NETHER | 53.2501, 5.8536      | F | NL9469052 | 135   | 196   | 38.5   | -     | black-white     | -               | - |   |
| PRJEB90816 | ERP173822 | ERS25067584 | Deep_Red24              | Deep_Red               | THE NETHER | 52.6895, 6.7483      | F | NL9469228 | 130   | 188   | 38.5   | -     | deep red        | -               | - |   |
| PRJEB90816 | ERP173822 | ERS25067640 | Groningen White Headed9 | Groningen White Headed | THE NETHER | 53.2127, 6.4025      | F | NL9475297 | 126   | 205   | 37.1   | -     | whiteheaded-bla | -               | - |   |
| PRJEB90816 | ERP173822 | ERS25067681 | Barrosa1                | BARROSA                | PORTUGAL   | 41.640931,-8.159356  | F | PT0130066 | 126   | 128   | 195    | 38.4  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067709 | Mertolenga1             | Mertolenga             | PORTUGAL   | 39.398480,-7.624583  | F | PT0151969 | 121   | 126.5 | 167    | 36.3  | -               | Roan            | - | - |
| PRJEB90816 | ERP173822 | ERS25067738 | Mirandesa1              | Mirandesa              | PORTUGAL   | 41.541172,-6.322920  | F | PT0163953 | 181.0 | 132.0 | 125.0  | 38.3  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067710 | Mertolenga2             | Mertolenga             | PORTUGAL   | 38.895472,-7.056043  | M | PT0169635 | 135   | 143   | 199    | 38.4  | 770             | uniform Red     | - | - |
| PRJEB90816 | ERP173822 | ERS25067747 | Mirandesa10             | Mirandesa              | PORTUGAL   | 41.543733,-6.328079  | M | PT0175279 | 233.0 | 150.0 | 151.0  | 38.2  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067711 | Mertolenga3             | Mertolenga             | PORTUGAL   | 38.895472,-7.056043  | F | PT0174414 | 118   | 122   | 164    | 38.73 | 465             | spotted Red     | - | - |
| PRJEB90816 | ERP173822 | ERS25067748 | Mirandesa11             | Mirandesa              | PORTUGAL   | 41.543733,-6.328079  | M | PT0194404 | 230.0 | 149.5 | 145.0  | 38.1  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067690 | Barrosa10               | BARROSA                | PORTUGAL   | 41.599247,-7.945265  | M | PT1137786 | -     | -     | -      | -     | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067749 | Mirandesa12             | Mirandesa              | PORTUGAL   | 41.350306,-6.602404  | F | PT1140184 | 199.5 | 138.0 | 131.0  | 38.90 | -               | -               | - | - |
| PRJEB76602 | ERP161107 | ERS20228812 | Holstein Friesian1      | Holstein Friesian      | PORTUGAL   | -                    | F | PT1168421 | -     | -     | -      | -     | -               | black and white | - | - |
| PRJEB90816 | ERP173822 | ERS25067691 | Barrosa11               | BARROSA                | PORTUGAL   | 41.618974,-7.955841  | F | PT1175099 | -     | -     | -      | -     | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067692 | Barrosa12               | BARROSA                | PORTUGAL   | 41.618974,-7.955841  | M | PT1175644 | -     | -     | -      | -     | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067712 | Mertolenga4             | Mertolenga             | PORTUGAL   | 37.935790,-7.608475  | F | PT1191368 | 118   | 127   | 153    | 39.25 | 349             | roan            | - | - |
| PRJEB90816 | ERP173822 | ERS25067750 | Mirandesa13             | Mirandesa              | PORTUGAL   | 41.350306,-6.602404  | M | PT1194392 | 225.0 | 146.0 | 142.0  | 38.6  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067713 | Mertolenga5             | Mertolenga             | PORTUGAL   | 37.956229,-7.422161  | F | PT1224548 | 123   | 130   | 176    | 38.74 | -               | -               | - | - |
| PRJEB76602 | ERP161108 | ERS20228811 | Holstein Friesian2      | Holstein Friesian      | PORTUGAL   | -                    | F | PT1658374 | -     | -     | -      | -     | -               | black and white | - | - |
| PRJEB90816 | ERP173822 | ERS25067714 | Mertolenga6             | Mertolenga             | PORTUGAL   | 37.956229,-7.422161  | M | PT2154743 | 132   | 136   | 197    | 38.78 | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067693 | Barrosa13               | BARROSA                | PORTUGAL   | 41.67639,-7.77165    | F | PT2157489 | 120   | 123   | 182    | 38.25 | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067694 | Barrosa14               | BARROSA                | PORTUGAL   | 41.67639,-7.77165    | F | PT2163355 | 130   | 128   | 182    | 38.2  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067695 | Barrosa15               | BARROSA                | PORTUGAL   | 41.622482,-7.606853  | F | PT2163704 | 117   | 115   | 179    | 37.5  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067715 | Mertolenga7             | Mertolenga             | PORTUGAL   | 38.803293,-8.049493  | F | PT2178123 | 131   | 140   | 207    | 37.1  | 868             | uniform Red     | - | - |
| PRJEB90816 | ERP173822 | ERS25067716 | Mertolenga8             | Mertolenga             | PORTUGAL   | 38.477921,-7.360926  | M | PT2191686 | 122   | 130   | 150    | 38.1  | 398             | spotted Red     | - | - |
| PRJEB90816 | ERP173822 | ERS25067751 | Mirandesa14             | Mirandesa              | PORTUGAL   | 41.316827,-6.5261977 | F | PT2195884 | 188.0 | 134.0 | 129.0  | 38.4  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067717 | Mertolenga9             | Mertolenga             | PORTUGAL   | 38.895472,-7.056043  | M | PT2196011 | 128   | 130   | 198    | -     | 684             | spotted Red     | - | - |
| PRJEB90816 | ERP173822 | ERS25067752 | Mirandesa15             | Mirandesa              | PORTUGAL   | 41.316827,-6.5261977 | F | PT2211925 | 191.0 | 137.0 | 128.0  | 38.8  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067696 | Barrosa16               | BARROSA                | PORTUGAL   | 41.622482,-7.606853  | M | PT2221676 | 135   | 134.5 | 211    | 38.1  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067718 | Mertolenga10            | Mertolenga             | PORTUGAL   | 38.424732,-7.882374  | M | PT2252574 | 111   | 130   | 181    | 37.6  | 560             | uniform Red     | - | - |
| PRJEB90816 | ERP173822 | ERS25067697 | Barrosa17               | BARROSA                | PORTUGAL   | 41.68300,-8.19522    | F | PT3137788 | -     | -     | -      | -     | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067698 | Barrosa18               | BARROSA                | PORTUGAL   | 41.68300,-8.19522    | F | PT3158221 | 123   | 117   | 176    | 38    | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067753 | Mirandesa16             | Mirandesa              | PORTUGAL   | 41.564435,-6.492882  | F | PT3174152 | 190.0 | 140   | 130.0  | 38    | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067699 | Barrosa19               | BARROSA                | PORTUGAL   | 41.67188-8.31261     | F | PT3174667 | 136   | 126   | 190    | 38.1  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067682 | Barrosa2                | BARROSA                | PORTUGAL   | 41.640931,-8.159356  | M | PT3181192 | -     | -     | -      | -     | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067719 | Mertolenga11            | Mertolenga             | PORTUGAL   | 38.471557,-7.908605  | F | PT3192164 | 111   | 117   | 176    | 38.6  | 423             | spotted Red     | - | - |
| PRJEB90816 | ERP173822 | ERS25067720 | Mertolenga12            | Mertolenga             | PORTUGAL   | 38.477921,-7.360926  | F | PT3192826 | -     | -     | -      | -     | 528             | roan            | - | - |
| PRJEB90816 | ERP173822 | ERS25067721 | Mertolenga13            | Mertolenga             | PORTUGAL   | 37.879935,-7.853176  | M | PT3638182 | 126   | 122   | 159    | 37.86 | 343             | roan            | - | - |
| PRJEB90816 | ERP173822 | ERS25067754 | Mirandesa17             | Mirandesa              | PORTUGAL   | 41.564435,-6.492882  | F | PT4140199 | 190.0 | 141   | 133.0  | 38.6  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067700 | Barrosa20               | BARROSA                | PORTUGAL   | 41.67188-8.31261     | F | PT4140741 | -     | -     | -      | -     | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067755 | Mirandesa18             | Mirandesa              | PORTUGAL   | 41.564435,-6.492882  | F | PT4141271 | 186.5 | 143.0 | 132.0  | 38.0  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067701 | Barrosa21               | BARROSA                | PORTUGAL   | 41.76289,-8.32073    | F | PT4155594 | 128   | 124   | 205(?) | 38    | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067756 | Mirandesa19             | Mirandesa              | PORTUGAL   | 41.564435,-6.492882  | M | PT4174282 | 228.0 | 151.5 | 148.0  | 37.8  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067702 | Barrosa22               | BARROSA                | PORTUGAL   | 41.76289,-8.32073    | F | PT4174667 | 133   | 122   | 187    | 38.5  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067722 | Mertolenga14            | Mertolenga             | PORTUGAL   | 39.398480,-7.624583  | M | PT4183427 | 128   | 126   | 187    | 38.5  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067723 | Mertolenga15            | Mertolenga             | PORTUGAL   | 38.895472,-7.056043  | M | PT4192499 | 130   | 135   | 200    | 38    | 782             | spotted Red     | - | - |
| PRJEB90816 | ERP173822 | ERS25067739 | Mirandesa2              | Mirandesa              | PORTUGAL   | 41.541172,-6.322920  | M | PT4196897 | 221.5 | 146.0 | 138.0  | 38.7  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067703 | Barrosa23               | BARROSA                | PORTUGAL   | 42.04826,-8.16257    | M | PT4225185 | 131   | 128   | 182    | 37    | -               | -               | - | - |
| PRJEB76602 | ERP161109 | ERS20228810 | Holstein Friesian3      | Holstein Friesian      | PORTUGAL   | -                    | F | PT5146151 | -     | -     | -      | -     | -               | black and white | - | - |
| PRJEB90816 | ERP173822 | ERS25067757 | Mirandesa20             | Mirandesa              | PORTUGAL   | 41.564435,-6.492882  | F | PT5150680 | 203.0 | 138.0 | 135.0  | 38.0  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067724 | Mertolenga16            | Mertolenga             | PORTUGAL   | 37.710668,-7.974896  | F | PT5166046 | 124   | 131   | 155    | 37.59 | 368             | uniform Red     | - | - |
| PRJEB90816 | ERP173822 | ERS25067764 | Mirandesa21             | Mirandesa              | PORTUGAL   | 41.854316,-6.5846029 | M | PT5175263 | 231.0 | 146.0 | 142.5  | -     | -               | black and white | - | - |
| PRJEB76602 | ERP161110 | ERS20228809 | Holstein Friesian4      | Holstein Friesian      | PORTUGAL   | -                    | F | PT5176416 | -     | -     | -      | -     | -               | black and white | - | - |
| PRJEB76602 | ERP161111 | ERS20228808 | Holstein Friesian5      | Holstein Friesian      | PORTUGAL   | -                    | F | PT5182208 | -     | -     | -      | -     | -               | black and white | - | - |
| PRJEB90816 | ERP173822 | ERS25067759 | Mirandesa22             | Mirandesa              | PORTUGAL   | 41.823744,-6.635364  | M | PT5194404 | 241.0 | 150.0 | 140.0  | 38.9  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067704 | Barrosa24               | BARROSA                | PORTUGAL   | 42.04826,-8.16257    | F | PT6155225 | -     | -     | -      | -     | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067760 | Mirandesa23             | Mirandesa              | PORTUGAL   | 41.823744,-6.635364  | F | PT6157973 | 230.0 | 140.0 | 130.0  | 38.85 | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067705 | Barrosa25               | BARROSA                | PORTUGAL   | 41.81604,-8.43814    | F | PT6163230 | -     | -     | -      | -     | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067706 | Barrosa26               | BARROSA                | PORTUGAL   | 41.81604,-8.43814    | M | PT6174288 | 141   | 141   | 225    | 38.25 | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067707 | Barrosa27               | BARROSA                | PORTUGAL   | 41.83750,-8.29201    | F | PT6175089 | -     | -     | -      | -     | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067761 | Mirandesa24             | Mirandesa              | PORTUGAL   | 41.834508,-6.8939827 | M | PT6175532 | 237.0 | 140.0 | 130.0  | 38.8  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067762 | Mirandesa25             | Mirandesa              | PORTUGAL   | 41.9357018,-6.917963 | M | PT6175595 | 218.0 | 145.0 | 142.0  | 38.7  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067725 | Mertolenga17            | Mertolenga             | PORTUGAL   | 38.471557,-7.908605  | M | PT6177087 | 119   | 126   | 169    | 38.64 | 405             | uniform Red     | - | - |
| PRJEB90816 | ERP173822 | ERS25067763 | Mirandesa26             | Mirandesa              | PORTUGAL   | 41.899730,-6.860714  | M | PT6196894 | 230.0 | 145.0 | 139.5  | 38.4  | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067726 | Mertolenga18            | Mertolenga             | PORTUGAL   | 38.895472,-7.056043  | F | PT6196951 | 131   | 132   | 198    | 38.84 | 704             | uniform Red     | - | - |
| PRJEB90816 | ERP173822 | ERS25067727 | Mertolenga19            | Mertolenga             | PORTUGAL   | 37.710668,-7.974896  | F | PT6199178 | 129   | 142   | 169    | -     | 546             | uniform Red     | - | - |
| PRJEB90816 | ERP173822 | ERS25067764 | Mirandesa27             | Mirandesa              | PORTUGAL   | 41.9357018,-6.917963 | F | PT6212189 | 212.0 | 136.0 | 132.0  | 38.20 | -               | -               | - | - |
| PRJEB90816 | ERP173822 | ERS25067728 | Mertolenga20            | Mertolenga             | PORTUGAL   | 38.471557,-7.908605  | F | PT66449   |       |       |        |       |                 |                 |   |   |

|            |           |             |              |            |          |                     |   |            |       |       |       |       |     |             |   |   |
|------------|-----------|-------------|--------------|------------|----------|---------------------|---|------------|-------|-------|-------|-------|-----|-------------|---|---|
| PRJEB90816 | ERP173822 | ERS25067745 | Mirandesa8   | Mirandesa  | PORTUGAL | 41.585018,-6.528758 | F | PT9174155  | 185.0 | 134.0 | 127.0 | 38.5  | -   | -           | - | - |
| PRJEB90816 | ERP173822 | ERS25067688 | Barrosa8     | BARROSA    | PORTUGAL | 41.580854,-7.929024 | M | PT91811950 | 136   | 137   | 208   | 38.73 | -   | -           | - | - |
| PRJEB90816 | ERP173822 | ERS25067736 | Mertolenga28 | Mertolenga | PORTUGAL | 38.895472,-7.056043 | F | PT91902460 | 126   | 137   | 187   | 38.7  | 694 | roan        | - | - |
| PRJEB90816 | ERP173822 | ERS25067746 | Mirandesa9   | Mirandesa  | PORTUGAL | 41.543733,-6.328079 | F | PT9194392  | 208.0 | 137.5 | 132.5 | 38.22 | -   | -           | - | - |
| PRJEB90816 | ERP173822 | ERS25067737 | Mertolenga29 | Mertolenga | PORTUGAL | 38.895472,-7.056043 | F | PT9220741  | 125   | 126   | 177   | 38.44 | 558 | spotted Red | - | - |
| PRJEB90816 | ERP173822 | ERS25067689 | Barrosa9     | BARROSA    | PORTUGAL | 41.599247,-7.945265 | M | PT9221266  | -     | -     | -     | -     | -   | -           | - | - |

**Table S2. Quality control information for each raw sequencing data file.**

| <b>OPTIBOV ID</b>    | <b>Total Bases</b> | <b>Q30 Bases</b> | <b>Q30 Rate</b> |
|----------------------|--------------------|------------------|-----------------|
| Eastern_Finncattle1  | 30,405,476,005     | 28,153,876,270   | 0.923           |
| Eastern_Finncattle2  | 31,908,330,349     | 29,676,802,918   | 0.930           |
| Eastern_Finncattle3  | 30,137,899,874     | 28,267,475,273   | 0.938           |
| Eastern_Finncattle4  | 32,249,788,166     | 30,093,422,583   | 0.933           |
| Eastern_Finncattle5  | 34,039,432,517     | 31,833,138,186   | 0.935           |
| Eastern_Finncattle6  | 31,542,853,755     | 29,523,018,820   | 0.936           |
| Eastern_Finncattle7  | 29,702,622,615     | 27,698,565,954   | 0.927           |
| Eastern_Finncattle8  | 30,991,968,886     | 29,056,708,869   | 0.933           |
| Eastern_Finncattle9  | 30,691,228,156     | 28,403,261,234   | 0.925           |
| Eastern_Finncattle10 | 36,691,944,128     | 34,268,058,764   | 0.934           |
| Eastern_Finncattle11 | 30,253,822,079     | 28,268,518,282   | 0.929           |
| Eastern_Finncattle12 | 34,649,256,245     | 32,035,013,241   | 0.925           |
| Eastern_Finncattle13 | 35,668,852,750     | 32,898,771,703   | 0.922           |
| Eastern_Finncattle14 | 33,750,204,102     | 31,680,545,134   | 0.939           |
| Eastern_Finncattle15 | 34,667,949,338     | 32,387,180,210   | 0.934           |
| Eastern_Finncattle16 | 31,869,601,778     | 29,800,142,008   | 0.935           |
| Eastern_Finncattle17 | 29,559,551,284     | 27,352,359,300   | 0.919           |
| Eastern_Finncattle18 | 32,632,149,609     | 30,532,512,237   | 0.936           |
| Eastern_Finncattle19 | 38,525,007,567     | 35,634,113,983   | 0.925           |
| Eastern_Finncattle20 | 33,221,373,252     | 30,871,110,721   | 0.929           |
| Eastern_Finncattle21 | 31,921,482,214     | 29,509,570,974   | 0.924           |
| Eastern_Finncattle22 | 34,603,038,847     | 32,048,908,215   | 0.926           |
| Eastern_Finncattle23 | 34,595,105,647     | 32,053,821,758   | 0.927           |
| Eastern_Finncattle24 | 35,874,046,125     | 33,254,544,125   | 0.927           |
| Eastern_Finncattle25 | 38,146,511,800     | 35,524,044,834   | 0.931           |
| Western_Finncattle1  | 29,744,213,210     | 27,831,446,814   | 0.936           |
| Western_Finncattle2  | 32,648,779,776     | 30,550,389,117   | 0.936           |
| Western_Finncattle3  | 31,731,589,349     | 29,698,664,588   | 0.936           |
| Western_Finncattle4  | 33,501,403,418     | 31,212,663,675   | 0.932           |
| Western_Finncattle5  | 29,943,724,964     | 28,082,388,718   | 0.938           |
| Western_Finncattle6  | 30,044,262,118     | 28,133,733,893   | 0.936           |
| Western_Finncattle7  | 30,438,020,573     | 28,429,457,663   | 0.934           |
| Western_Finncattle8  | 32,471,521,043     | 30,438,049,235   | 0.937           |
| Western_Finncattle9  | 30,036,211,122     | 27,438,524,642   | 0.912           |
| Western_Finncattle10 | 29,768,873,169     | 27,709,455,089   | 0.927           |
| Western_Finncattle11 | 31,226,060,238     | 29,099,885,950   | 0.932           |
| Western_Finncattle12 | 30,960,730,967     | 28,948,060,674   | 0.935           |
| Western_Finncattle13 | 30,577,646,704     | 28,615,303,833   | 0.936           |
| Western_Finncattle14 | 29,733,017,265     | 27,697,610,310   | 0.929           |
| Western_Finncattle15 | 34,909,522,495     | 32,801,378,170   | 0.940           |
| Western_Finncattle16 | 30,062,335,292     | 28,037,857,521   | 0.932           |
| Western_Finncattle17 | 31,030,124,054     | 28,712,608,190   | 0.925           |
| Western_Finncattle18 | 31,355,018,898     | 29,255,710,036   | 0.933           |
| Western_Finncattle19 | 34,184,351,779     | 31,946,094,905   | 0.935           |
| Western_Finncattle20 | 30,065,068,727     | 28,177,819,779   | 0.931           |
| Western_Finncattle21 | 30,411,640,483     | 28,243,333,845   | 0.923           |
| Western_Finncattle22 | 30,223,470,979     | 28,275,246,611   | 0.930           |
| Western_Finncattle23 | 36,030,172,609     | 33,479,464,700   | 0.929           |
| Western_Finncattle24 | 35,204,379,778     | 32,892,904,747   | 0.934           |
| Western_Finncattle25 | 38,966,241,113     | 36,546,899,897   | 0.938           |
| Northern_Finncattle1 | 33,118,267,581     | 30,986,033,888   | 0.936           |
| Northern_Finncattle2 | 30,449,755,665     | 28,254,416,294   | 0.928           |
| Northern_Finncattle3 | 29,762,095,682     | 27,707,691,031   | 0.929           |
| Northern_Finncattle4 | 33,675,509,592     | 31,596,033,210   | 0.938           |
| Northern_Finncattle5 | 32,076,472,399     | 29,802,502,315   | 0.929           |
| Northern_Finncattle6 | 30,274,815,940     | 28,094,464,378   | 0.927           |

|                       |                |                |       |
|-----------------------|----------------|----------------|-------|
| Northern_Finncattle7  | 29,988,567,666 | 27,899,208,673 | 0.930 |
| Northern_Finncattle8  | 29,594,637,186 | 27,527,257,789 | 0.928 |
| Northern_Finncattle9  | 32,369,620,620 | 30,086,219,675 | 0.927 |
| Northern_Finncattle10 | 30,319,250,002 | 28,186,859,999 | 0.926 |
| Northern_Finncattle11 | 35,103,685,278 | 32,801,188,069 | 0.934 |
| Northern_Finncattle12 | 34,229,363,116 | 31,930,817,771 | 0.933 |
| Northern_Finncattle13 | 31,417,017,903 | 29,355,682,809 | 0.934 |
| Northern_Finncattle14 | 30,096,193,445 | 28,064,574,092 | 0.932 |
| Northern_Finncattle15 | 30,045,857,391 | 28,045,879,511 | 0.932 |
| Northern_Finncattle16 | 30,551,888,122 | 28,426,397,510 | 0.930 |
| Northern_Finncattle17 | 32,230,035,533 | 30,076,625,044 | 0.933 |
| Northern_Finncattle18 | 31,923,467,214 | 29,745,639,847 | 0.934 |
| Northern_Finncattle19 | 31,192,754,769 | 29,106,204,280 | 0.933 |
| Northern_Finncattle20 | 36,591,109,918 | 34,239,723,785 | 0.936 |
| Northern_Finncattle21 | 34,023,244,419 | 31,533,324,075 | 0.927 |
| Northern_Finncattle22 | 34,943,203,527 | 32,517,570,785 | 0.931 |
| Northern_Finncattle23 | 38,387,941,996 | 35,807,424,306 | 0.933 |
| Northern_Finncattle24 | 37,656,141,177 | 35,253,796,576 | 0.936 |
| Northern_Finncattle25 | 32,744,787,142 | 30,622,175,664 | 0.935 |
| Holstein_Friesian1    | 29,918,566,482 | 27,894,739,535 | 0.931 |
| Holstein_Friesian2    | 31,123,579,454 | 29,070,274,174 | 0.931 |
| Holstein_Friesian3    | 31,945,922,303 | 29,604,302,993 | 0.927 |
| Holstein_Friesian4    | 30,015,381,557 | 27,982,383,453 | 0.932 |
| Holstein_Friesian5    | 32,679,484,689 | 30,339,394,182 | 0.928 |
| Deep_Red1             | 30,270,419,236 | 27,120,385,630 | 0.896 |
| Deep_Red2             | 34,190,045,414 | 30,993,993,722 | 0.907 |
| Deep_Red3             | 35,230,932,157 | 31,831,428,295 | 0.904 |
| Deep_Red4             | 35,496,046,353 | 32,951,865,384 | 0.928 |
| Deep_Red5             | 29,918,751,537 | 26,920,488,931 | 0.900 |
| Deep_Red6             | 31,855,372,645 | 29,119,321,369 | 0.914 |
| Deep_Red7             | 29,941,508,722 | 26,902,200,777 | 0.908 |
| Deep_Red8             | 29,663,143,841 | 27,032,459,044 | 0.917 |
| Deep_Red9             | 32,616,661,783 | 29,089,896,909 | 0.892 |
| Deep_Red10            | 29,965,170,703 | 26,590,461,972 | 0.898 |
| Deep_Red11            | 33,859,330,440 | 30,541,958,422 | 0.902 |
| Deep_Red12            | 33,339,107,358 | 29,845,915,705 | 0.895 |
| Deep_Red13            | 31,003,096,703 | 28,183,687,481 | 0.909 |
| Deep_Red14            | 31,185,287,981 | 28,411,391,472 | 0.911 |
| Deep_Red15            | 32,769,340,274 | 29,721,043,470 | 0.907 |
| Deep_Red16            | 30,080,244,917 | 26,950,069,738 | 0.905 |
| Deep_Red17            | 30,267,237,674 | 27,599,520,289 | 0.918 |
| Deep_Red18            | 30,328,812,142 | 27,654,028,836 | 0.912 |
| Deep_Red19            | 29,603,898,238 | 26,911,015,647 | 0.917 |
| Deep_Red20            | 31,207,943,430 | 28,209,077,309 | 0.904 |
| Deep_Red21            | 39,721,899,682 | 35,702,761,560 | 0.899 |
| Deep_Red22            | 29,680,146,258 | 26,560,206,266 | 0.905 |
| Deep_Red23            | 56,024,682,721 | 52,641,592,350 | 0.940 |
| Deep_Red24            | 29,878,068,092 | 27,072,002,385 | 0.913 |
| Dutch_belted1         | 43,539,202,799 | 39,993,075,258 | 0.919 |
| Dutch_belted2         | 29,982,412,740 | 27,219,133,317 | 0.914 |
| Dutch_belted3         | 32,430,140,925 | 29,260,259,978 | 0.902 |
| Dutch_belted4         | 33,751,770,226 | 30,344,614,305 | 0.899 |
| Dutch_belted5         | 42,968,956,461 | 38,656,767,285 | 0.900 |
| Dutch_belted6         | 36,441,766,008 | 32,890,449,114 | 0.903 |
| Dutch_belted7         | 45,687,455,762 | 41,714,784,444 | 0.913 |
| Dutch_belted8         | 38,284,717,016 | 35,371,686,029 | 0.924 |
| Dutch_belted9         | 30,466,423,997 | 27,696,121,507 | 0.916 |
| Dutch_belted10        | 31,831,724,389 | 28,719,179,918 | 0.902 |

|                          |                |                |       |
|--------------------------|----------------|----------------|-------|
| Dutch belted11           | 30,645,806,459 | 27,921,353,264 | 0.920 |
| Dutch belted12           | 31,531,021,313 | 28,493,027,288 | 0.904 |
| Dutch belted13           | 30,887,436,300 | 27,900,817,501 | 0.903 |
| Dutch belted14           | 29,680,146,258 | 26,560,206,266 | 0.905 |
| Dutch belted15           | 33,345,310,117 | 30,217,496,119 | 0.906 |
| Dutch belted16           | 29,491,254,897 | 27,142,909,522 | 0.925 |
| Dutch belted17           | 30,058,514,991 | 27,352,384,835 | 0.917 |
| Dutch belted18           | 39,127,813,843 | 35,243,606,012 | 0.901 |
| Dutch belted19           | 30,622,703,566 | 27,598,568,705 | 0.910 |
| Dutch belted20           | 49,848,013,224 | 46,112,474,652 | 0.925 |
| Dutch belted21           | 29,423,935,417 | 26,342,391,572 | 0.903 |
| Dutch belted22           | 36,050,101,879 | 32,521,544,669 | 0.902 |
| Dutch belted23           | 36,577,501,564 | 33,206,952,068 | 0.908 |
| Dutch Friesian1          | 34,966,813,313 | 31,508,041,313 | 0.901 |
| Dutch Friesian2          | 29,903,064,553 | 26,735,093,203 | 0.903 |
| Dutch Friesian3          | 30,051,272,963 | 27,001,586,463 | 0.909 |
| Dutch Friesian4          | 32,502,137,917 | 29,377,600,339 | 0.904 |
| Dutch Friesian5          | 38,328,716,929 | 35,043,065,168 | 0.914 |
| Dutch Friesian6          | 30,801,446,468 | 27,403,116,142 | 0.890 |
| Dutch Friesian7          | 31,644,673,413 | 29,127,176,249 | 0.920 |
| Dutch Friesian8          | 30,318,643,266 | 27,392,577,450 | 0.912 |
| Dutch Friesian9          | 29,757,199,762 | 26,905,189,503 | 0.912 |
| Dutch Friesian10         | 34,922,196,928 | 31,585,314,369 | 0.904 |
| Dutch Friesian11         | 39,787,940,877 | 36,791,825,318 | 0.925 |
| Dutch Friesian12         | 29,931,468,106 | 27,035,287,558 | 0.910 |
| Dutch Friesian13         | 47,273,718,272 | 43,291,540,597 | 0.916 |
| Dutch Friesian14         | 39,268,909,751 | 35,969,281,851 | 0.916 |
| Dutch Friesian15         | 36,583,562,874 | 32,966,752,817 | 0.901 |
| Dutch Friesian16         | 29,731,536,596 | 26,695,608,028 | 0.907 |
| Dutch Friesian17         | 29,836,788,535 | 26,821,840,605 | 0.908 |
| Dutch Friesian18         | 30,171,868,542 | 27,308,722,917 | 0.905 |
| Dutch Friesian19         | 32,400,073,650 | 29,426,399,708 | 0.908 |
| Dutch Friesian20         | 35,074,085,609 | 31,608,408,760 | 0.901 |
| Dutch Friesian21         | 37,569,884,463 | 34,614,036,910 | 0.921 |
| Dutch Friesian22         | 44,496,637,873 | 41,759,727,348 | 0.938 |
| Dutch Friesian23         | 33,391,961,584 | 30,254,161,295 | 0.906 |
| Dutch Friesian24         | 32,955,078,004 | 29,768,267,568 | 0.903 |
| Groningen White Headed1  | 33,363,798,916 | 29,781,791,141 | 0.893 |
| Groningen White Headed2  | 35,208,048,474 | 32,076,681,873 | 0.911 |
| Groningen White Headed3  | 35,092,869,326 | 31,658,016,040 | 0.902 |
| Groningen White Headed4  | 32,594,591,093 | 29,525,673,861 | 0.906 |
| Groningen White Headed5  | 30,127,010,227 | 27,168,744,072 | 0.902 |
| Groningen White Headed6  | 29,629,022,987 | 26,527,178,196 | 0.904 |
| Groningen White Headed7  | 29,980,605,323 | 26,974,250,481 | 0.900 |
| Groningen White Headed8  | 31,085,934,222 | 28,073,692,080 | 0.903 |
| Groningen White Headed9  | 29,707,615,676 | 26,857,747,237 | 0.912 |
| Groningen White Headed10 | 36,081,017,092 | 32,973,756,310 | 0.914 |
| Groningen White Headed11 | 29,836,956,345 | 27,184,425,571 | 0.911 |
| Groningen White Headed12 | 39,808,396,195 | 35,828,665,268 | 0.900 |
| Groningen White Headed13 | 29,646,234,639 | 26,288,053,911 | 0.887 |
| Groningen White Headed14 | 31,280,991,507 | 28,088,328,545 | 0.898 |
| Groningen White Headed15 | 30,394,263,484 | 27,683,605,158 | 0.911 |
| Groningen White Headed16 | 37,396,719,521 | 34,196,411,790 | 0.914 |
| Groningen White Headed17 | 42,720,083,697 | 38,641,667,684 | 0.905 |
| Groningen White Headed18 | 31,013,734,941 | 27,836,432,191 | 0.898 |
| Groningen White Headed19 | 32,739,756,342 | 29,965,031,379 | 0.915 |
| Groningen White Headed20 | 37,884,425,814 | 34,250,185,437 | 0.904 |
| Groningen White Headed21 | 29,943,837,303 | 27,227,300,243 | 0.915 |

|                    |                |                |       |
|--------------------|----------------|----------------|-------|
| Holstein Friesian1 | 36,582,815,309 | 33,263,554,970 | 0.909 |
| Holstein Friesian2 | 43,355,177,537 | 39,790,041,937 | 0.918 |
| Holstein Friesian3 | 31,087,081,866 | 27,998,226,693 | 0.901 |
| Holstein Friesian4 | 29,949,898,299 | 27,091,182,453 | 0.916 |
| Holstein Friesian5 | 29,693,988,666 | 26,756,294,098 | 0.901 |
| MRY1               | 30,306,939,924 | 26,997,794,530 | 0.891 |
| MRY2               | 29,382,501,924 | 26,526,276,599 | 0.909 |
| MRY3               | 31,722,619,148 | 28,535,526,236 | 0.900 |
| MRY4               | 29,809,712,367 | 26,883,079,471 | 0.902 |
| MRY5               | 39,367,644,711 | 37,194,897,403 | 0.945 |
| MRY6               | 40,906,796,243 | 36,495,963,452 | 0.892 |
| MRY7               | 39,614,213,956 | 35,800,936,980 | 0.904 |
| MRY8               | 31,359,551,645 | 28,505,137,757 | 0.909 |
| MRY9               | 35,379,814,474 | 31,889,235,243 | 0.901 |
| MRY10              | 30,005,767,013 | 27,252,233,118 | 0.908 |
| MRY11              | 41,597,854,929 | 36,922,193,054 | 0.888 |
| MRY12              | 36,263,901,897 | 33,365,265,679 | 0.920 |
| MRY13              | 42,987,696,866 | 39,179,580,810 | 0.911 |
| MRY14              | 32,823,229,035 | 29,793,196,483 | 0.908 |
| MRY15              | 31,125,122,781 | 28,372,556,143 | 0.919 |
| MRY16              | 40,397,268,167 | 38,282,083,703 | 0.948 |
| MRY17              | 34,803,532,073 | 31,087,183,473 | 0.893 |
| MRY18              | 35,096,887,375 | 32,185,676,934 | 0.917 |
| MRY19              | 43,381,020,385 | 40,662,957,042 | 0.937 |
| MRY20              | 34,946,919,916 | 32,079,911,901 | 0.918 |
| MRY21              | 37,523,364,589 | 33,804,184,062 | 0.901 |
| MRY22              | 33,088,526,860 | 30,330,962,722 | 0.917 |
| MRY23              | 40,322,155,442 | 37,825,519,431 | 0.938 |
| Barrosa1           | 31,372,666,002 | 28,971,029,433 | 0.923 |
| Barrosa2           | 46,119,586,098 | 43,559,121,264 | 0.944 |
| Barrosa3           | 30,702,158,350 | 28,902,639,513 | 0.941 |
| Barrosa4           | 39,306,572,736 | 36,887,353,108 | 0.938 |
| Barrosa5           | 35,443,882,243 | 33,257,058,599 | 0.938 |
| Barrosa6           | 31,506,513,709 | 29,788,946,306 | 0.945 |
| Barrosa7           | 32,659,076,697 | 30,490,330,125 | 0.934 |
| Barrosa8           | 38,594,670,025 | 36,464,930,705 | 0.945 |
| Barrosa9           | 35,886,291,355 | 33,767,670,368 | 0.941 |
| Barrosa10          | 36,520,567,492 | 33,978,417,692 | 0.930 |
| Barrosa11          | 36,799,932,808 | 34,380,805,257 | 0.934 |
| Barrosa12          | 37,240,527,621 | 35,042,310,163 | 0.941 |
| Barrosa13          | 33,143,072,214 | 31,036,230,692 | 0.936 |
| Barrosa14          | 38,360,323,685 | 36,061,171,034 | 0.940 |
| Barrosa15          | 34,953,634,215 | 32,875,858,764 | 0.941 |
| Barrosa16          | 30,277,393,119 | 28,127,705,742 | 0.929 |
| Barrosa17          | 34,088,810,027 | 31,954,715,656 | 0.937 |
| Barrosa18          | 41,943,095,379 | 39,392,725,709 | 0.939 |
| Barrosa19          | 30,918,786,310 | 28,940,628,285 | 0.936 |
| Barrosa20          | 26,564,531,445 | 25,058,905,207 | 0.943 |
| Barrosa21          | 37,896,369,360 | 35,781,581,451 | 0.944 |
| Barrosa22          | 31,079,089,760 | 29,335,483,424 | 0.944 |
| Barrosa23          | 39,078,927,668 | 36,708,351,130 | 0.939 |
| Barrosa24          | 34,344,116,058 | 32,280,531,466 | 0.940 |
| Barrosa25          | 38,404,739,312 | 36,028,263,167 | 0.938 |
| Barrosa26          | 36,160,759,480 | 34,028,990,703 | 0.941 |
| Barrosa27          | 35,922,746,861 | 33,713,306,415 | 0.938 |
| Barrosa28          | 35,239,557,630 | 33,198,788,501 | 0.942 |
| Mertolenga1        | 40,353,716,622 | 38,038,097,404 | 0.943 |
| Mertolenga2        | 33,636,410,068 | 31,511,731,348 | 0.937 |



|                    |                |                |       |
|--------------------|----------------|----------------|-------|
| Mertolenga3        | 38,713,001,646 | 36,388,362,815 | 0.940 |
| Mertolenga4        | 36,126,350,501 | 34,043,225,522 | 0.942 |
| Mertolenga5        | 35,771,545,141 | 33,814,245,297 | 0.945 |
| Mertolenga6        | 44,345,974,871 | 41,897,497,279 | 0.945 |
| Mertolenga7        | 39,244,678,670 | 36,989,133,219 | 0.943 |
| Mertolenga8        | 30,164,706,602 | 28,379,625,181 | 0.940 |
| Mertolenga9        | 33,465,212,742 | 31,407,366,065 | 0.939 |
| Mertolenga10       | 46,662,402,614 | 43,899,405,717 | 0.941 |
| Mertolenga11       | 36,178,657,690 | 33,957,089,912 | 0.939 |
| Mertolenga12       | 32,759,038,655 | 30,651,327,078 | 0.936 |
| Mertolenga13       | 32,535,466,501 | 30,510,402,071 | 0.938 |
| Mertolenga14       | 40,312,410,657 | 38,049,017,531 | 0.944 |
| Mertolenga15       | 39,324,212,769 | 37,252,622,754 | 0.947 |
| Mertolenga16       | 32,446,295,375 | 30,458,206,618 | 0.939 |
| Mertolenga17       | 35,102,337,832 | 32,809,727,341 | 0.935 |
| Mertolenga18       | 35,471,150,790 | 32,872,945,387 | 0.927 |
| Mertolenga19       | 37,389,563,212 | 35,227,339,600 | 0.942 |
| Mertolenga20       | 34,666,011,143 | 32,603,550,670 | 0.941 |
| Mertolenga21       | 32,937,951,624 | 30,989,259,435 | 0.940 |
| Mertolenga22       | 40,582,919,284 | 37,662,180,676 | 0.928 |
| Mertolenga23       | 31,507,699,201 | 29,186,579,082 | 0.926 |
| Mertolenga24       | 40,949,494,056 | 38,687,895,642 | 0.945 |
| Mertolenga25       | 40,615,787,614 | 38,346,612,477 | 0.944 |
| Mertolenga26       | 32,591,619,940 | 30,649,288,148 | 0.940 |
| Mertolenga27       | 37,128,932,392 | 35,022,976,074 | 0.943 |
| Mertolenga28       | 34,535,714,637 | 32,393,303,635 | 0.938 |
| Mertolenga29       | 32,833,801,228 | 30,889,895,673 | 0.941 |
| Mirandesa1         | 34,136,564,833 | 32,035,251,373 | 0.938 |
| Mirandesa2         | 34,996,278,887 | 32,787,511,403 | 0.937 |
| Mirandesa3         | 39,054,591,324 | 36,692,505,514 | 0.940 |
| Mirandesa4         | 45,157,168,489 | 42,524,749,671 | 0.942 |
| Mirandesa5         | 32,627,143,112 | 30,589,722,739 | 0.938 |
| Mirandesa6         | 30,533,139,870 | 28,795,766,125 | 0.940 |
| Mirandesa7         | 47,077,993,509 | 44,476,920,769 | 0.945 |
| Mirandesa8         | 34,941,958,118 | 33,091,636,247 | 0.947 |
| Mirandesa9         | 33,189,753,392 | 31,151,894,451 | 0.939 |
| Mirandesa10        | 35,848,677,792 | 33,612,123,822 | 0.938 |
| Mirandesa11        | 38,397,084,984 | 36,235,014,044 | 0.944 |
| Mirandesa12        | 36,814,370,400 | 34,334,118,117 | 0.933 |
| Mirandesa13        | 30,486,980,048 | 28,570,885,100 | 0.937 |
| Mirandesa14        | 32,680,619,331 | 30,738,017,015 | 0.941 |
| Mirandesa15        | 38,186,852,945 | 36,060,870,652 | 0.944 |
| Mirandesa16        | 36,351,249,783 | 34,161,765,016 | 0.940 |
| Mirandesa17        | 35,712,722,950 | 33,707,638,085 | 0.944 |
| Mirandesa18        | 36,258,295,044 | 34,171,328,581 | 0.942 |
| Mirandesa19        | 32,514,357,350 | 30,681,744,615 | 0.944 |
| Mirandesa20        | 36,893,555,537 | 34,566,413,735 | 0.937 |
| Mirandesa21        | 33,875,635,893 | 31,779,449,171 | 0.938 |
| Mirandesa22        | 34,625,040,548 | 32,565,705,327 | 0.941 |
| Mirandesa23        | 32,464,928,303 | 30,483,721,208 | 0.939 |
| Mirandesa24        | 37,907,035,308 | 35,789,719,967 | 0.944 |
| Mirandesa25        | 34,165,132,223 | 32,092,578,504 | 0.939 |
| Mirandesa26        | 41,566,161,897 | 39,037,487,252 | 0.939 |
| Mirandesa27        | 34,738,512,158 | 32,707,169,984 | 0.942 |
| Holstein_Friesian1 | 34,444,904,685 | 32,396,208,084 | 0.941 |
| Holstein_Friesian2 | 34,416,116,092 | 32,224,863,491 | 0.936 |
| Holstein_Friesian3 | 35,902,640,142 | 33,655,276,123 | 0.937 |
| Holstein_Friesian4 | 47,833,273,244 | 44,930,717,604 | 0.939 |

|                    |                |                |       |
|--------------------|----------------|----------------|-------|
| Holstein_Friesian5 | 46,962,449,206 | 44,250,203,681 | 0.942 |
|--------------------|----------------|----------------|-------|

**Table S3. Post-QC mapping coverages on individuals for each European local cattle breed.**

| <b>OPTIBOV ID</b>   | <b>Breed</b>        | <b>Mean coverage</b> | <b>Coverage of reference genome</b> | <b>Contry</b> |
|---------------------|---------------------|----------------------|-------------------------------------|---------------|
| Eastern Finncattle1 | Western Finncattle  | 8.9296               | 98.5091                             | Finland       |
| Eastern Finncattle2 | Western Finncattle  | 9.095                | 98.4234                             | Finland       |
| Eastern Finncattle3 | Western Finncattle  | 8.9135               | 98.3641                             | Finland       |
| Eastern Finncattle4 | Western Finncattle  | 9.4461               | 98.5465                             | Finland       |
| Eastern Finncattle5 | Western Finncattle  | 10.1154              | 98.6301                             | Finland       |
| Eastern Finncattle6 | Western Finncattle  | 9.3519               | 98.5463                             | Finland       |
| Eastern Finncattle7 | Western Finncattle  | 8.8527               | 98.5911                             | Finland       |
| Eastern Finncattle8 | Western Finncattle  | 9.3077               | 98.6033                             | Finland       |
| Eastern Finncattle9 | Western Finncattle  | 9.0652               | 98.523                              | Finland       |
| Eastern Finncattle1 | Western Finncattle  | 10.5613              | 98.6141                             | Finland       |
| Eastern Finncattle1 | Western Finncattle  | 8.884                | 98.5053                             | Finland       |
| Eastern Finncattle1 | Western Finncattle  | 9.6796               | 98.6735                             | Finland       |
| Eastern Finncattle1 | Western Finncattle  | 10.5553              | 98.6783                             | Finland       |
| Eastern Finncattle1 | Western Finncattle  | 10.0927              | 98.5901                             | Finland       |
| Eastern Finncattle1 | Western Finncattle  | 10.2322              | 98.5231                             | Finland       |
| Eastern Finncattle1 | Western Finncattle  | 9.4629               | 98.5357                             | Finland       |
| Eastern Finncattle1 | Western Finncattle  | 8.8337               | 98.4305                             | Finland       |
| Eastern Finncattle1 | Western Finncattle  | 9.6444               | 98.5565                             | Finland       |
| Eastern Finncattle1 | Western Finncattle  | 10.7751              | 98.6946                             | Finland       |
| Eastern Finncattle2 | Western Finncattle  | 9.4354               | 98.6778                             | Finland       |
| Eastern Finncattle2 | Western Finncattle  | 8.8548               | 98.6376                             | Finland       |
| Eastern Finncattle2 | Western Finncattle  | 9.7568               | 98.6216                             | Finland       |
| Eastern Finncattle2 | Western Finncattle  | 9.715                | 98.6263                             | Finland       |
| Eastern Finncattle2 | Western Finncattle  | 10.0394              | 98.7719                             | Finland       |
| Eastern Finncattle2 | Western Finncattle  | 10.668               | 98.6948                             | Finland       |
| Western Finncattle  | Northern Finncattle | 8.9035               | 98.516                              | Finland       |
| Western Finncattle  | Northern Finncattle | 9.6322               | 98.5674                             | Finland       |
| Western Finncattle  | Northern Finncattle | 9.3759               | 98.5589                             | Finland       |
| Western Finncattle  | Northern Finncattle | 9.8891               | 98.4744                             | Finland       |
| Western Finncattle  | Northern Finncattle | 8.9961               | 98.5166                             | Finland       |
| Western Finncattle  | Northern Finncattle | 8.9857               | 98.5723                             | Finland       |
| Western Finncattle  | Northern Finncattle | 9.0038               | 98.5138                             | Finland       |
| Western Finncattle  | Northern Finncattle | 9.5922               | 98.6718                             | Finland       |
| Western Finncattle  | Northern Finncattle | 9.1424               | 98.6121                             | Finland       |
| Western Finncattle  | Northern Finncattle | 8.9445               | 98.4659                             | Finland       |
| Western Finncattle  | Northern Finncattle | 9.2023               | 98.5991                             | Finland       |
| Western Finncattle  | Northern Finncattle | 9.0784               | 98.662                              | Finland       |
| Western Finncattle  | Northern Finncattle | 9.2179               | 98.5264                             | Finland       |
| Western Finncattle  | Northern Finncattle | 9.0085               | 98.5692                             | Finland       |
| Western Finncattle  | Northern Finncattle | 10.4313              | 98.6299                             | Finland       |
| Western Finncattle  | Northern Finncattle | 9.1441               | 98.604                              | Finland       |
| Western Finncattle  | Northern Finncattle | 9.2414               | 98.4722                             | Finland       |
| Western Finncattle  | Northern Finncattle | 9.2028               | 98.4719                             | Finland       |
| Western Finncattle  | Northern Finncattle | 10.0764              | 98.6723                             | Finland       |
| Western Finncattle  | Northern Finncattle | 9.1534               | 98.5086                             | Finland       |
| Western Finncattle  | Northern Finncattle | 9.1281               | 98.6018                             | Finland       |
| Western Finncattle  | Northern Finncattle | 8.9531               | 98.5309                             | Finland       |
| Western Finncattle  | Northern Finncattle | 10.3739              | 98.7011                             | Finland       |
| Western Finncattle  | Northern Finncattle | 10.4782              | 98.6437                             | Finland       |
| Western Finncattle  | Northern Finncattle | 11.4925              | 98.6126                             | Finland       |
| Northern Finncattle | Eastern Finncattle  | 9.6872               | 98.6842                             | Finland       |
| Northern Finncattle | Eastern Finncattle  | 9.1553               | 98.333                              | Finland       |
| Northern Finncattle | Eastern Finncattle  | 8.8357               | 98.2683                             | Finland       |
| Northern Finncattle | Eastern Finncattle  | 9.8848               | 98.5683                             | Finland       |
| Northern Finncattle | Eastern Finncattle  | 9.6731               | 98.1941                             | Finland       |
| Northern Finncattle | Eastern Finncattle  | 9.1442               | 98.2328                             | Finland       |
| Northern Finncattle | Eastern Finncattle  | 8.8992               | 98.4435                             | Finland       |
| Northern Finncattle | Eastern Finncattle  | 9.1692               | 96.9977                             | Finland       |
| Northern Finncattle | Eastern Finncattle  | 9.9725               | 98.6093                             | Finland       |

|                     |                        |         |         |                 |
|---------------------|------------------------|---------|---------|-----------------|
| Northern Finncattle | Eastern Finncattle     | 9.1769  | 98.5458 | Finland         |
| Northern Finncattle | Eastern Finncattle     | 10.4078 | 98.6839 | Finland         |
| Northern Finncattle | Eastern Finncattle     | 10.0045 | 98.607  | Finland         |
| Northern Finncattle | Eastern Finncattle     | 9.6406  | 98.392  | Finland         |
| Northern Finncattle | Eastern Finncattle     | 9.2179  | 98.5555 | Finland         |
| Northern Finncattle | Eastern Finncattle     | 9.0596  | 98.4693 | Finland         |
| Northern Finncattle | Eastern Finncattle     | 9.1073  | 98.5286 | Finland         |
| Northern Finncattle | Eastern Finncattle     | 9.4905  | 98.5375 | Finland         |
| Northern Finncattle | Eastern Finncattle     | 9.8296  | 98.5236 | Finland         |
| Northern Finncattle | Eastern Finncattle     | 9.2563  | 98.5932 | Finland         |
| Northern Finncattle | Eastern Finncattle     | 10.5981 | 98.7055 | Finland         |
| Northern Finncattle | Eastern Finncattle     | 10.1007 | 98.6913 | Finland         |
| Northern Finncattle | Eastern Finncattle     | 10.3018 | 98.7083 | Finland         |
| Northern Finncattle | Eastern Finncattle     | 11.4028 | 98.7632 | Finland         |
| Northern Finncattle | Eastern Finncattle     | 11.0157 | 98.4389 | Finland         |
| Northern Finncattle | Eastern Finncattle     | 9.726   | 97.946  | Finland         |
| Holstein Friesian1  | Holstein Friesian      | 9.1077  | 98.552  | Finland         |
| Holstein Friesian2  | Holstein Friesian      | 9.4332  | 98.5994 | Finland         |
| Holstein Friesian3  | Holstein Friesian      | 9.5355  | 98.5771 | Finland         |
| Holstein Friesian4  | Holstein Friesian      | 8.9954  | 98.5024 | Finland         |
| Holstein Friesian5  | Holstein Friesian      | 9.7121  | 98.528  | Finland         |
| Deep_Red1           | Dutch belted           | 9.7753  | 98.6537 | The Netherlands |
| Deep_Red2           | Dutch belted           | 11.0213 | 98.7478 | The Netherlands |
| Deep_Red3           | Deep_Red               | 11.2897 | 98.723  | The Netherlands |
| Deep_Red4           | Dutch Friesian         | 11.2089 | 98.6118 | The Netherlands |
| Deep_Red5           | Dutch belted           | 9.6429  | 98.5641 | The Netherlands |
| Deep_Red6           | Dutch belted           | 10.2635 | 98.6859 | The Netherlands |
| Deep_Red7           | Dutch belted           | 9.7228  | 98.6673 | The Netherlands |
| Deep_Red8           | Groningen White Headed | 9.6106  | 98.5976 | The Netherlands |
| Deep_Red9           | MRY                    | 10.5975 | 98.6441 | The Netherlands |
| Deep_Red10          | Groningen White Headed | 9.9125  | 98.6888 | The Netherlands |
| Deep_Red11          | Dutch Friesian         | 10.907  | 98.7165 | The Netherlands |
| Deep_Red12          | Deep_Red 100           | 10.8511 | 98.5614 | The Netherlands |
| Deep_Red13          | Deep_Red               | 10.0274 | 98.8051 | The Netherlands |
| Deep_Red14          | MRY                    | 10.1588 | 98.6737 | The Netherlands |
| Deep_Red15          | Groningen White Headed | 10.6014 | 98.7111 | The Netherlands |
| Deep_Red16          | Dutch Friesian         | 9.7969  | 98.6656 | The Netherlands |
| Deep_Red17          | MRY                    | 9.7295  | 98.5236 | The Netherlands |
| Deep_Red18          | Deep_Red               | 9.8137  | 98.5568 | The Netherlands |
| Deep_Red19          | Deep_Red               | 9.6317  | 98.5355 | The Netherlands |
| Deep_Red20          | MRY                    | 10.2088 | 98.6638 | The Netherlands |
| Deep_Red21          | Dutch Friesian         | 12.6649 | 98.7476 | The Netherlands |
| Deep_Red22          | Groningen White Headed | 9.534   | 98.3968 | The Netherlands |
| Deep_Red23          | MRY                    | 16.1061 | 98.8742 | The Netherlands |
| Deep_Red24          | MRY                    | 9.4422  | 98.5158 | The Netherlands |
| Dutch belted1       | MRY                    | 13.4903 | 98.7205 | The Netherlands |
| Dutch belted2       | Dutch Friesian         | 9.7165  | 98.5285 | The Netherlands |
| Dutch belted3       | Dutch Friesian         | 9.0844  | 98.502  | The Netherlands |
| Dutch belted4       | Dutch Friesian         | 11.0353 | 98.6347 | The Netherlands |
| Dutch belted5       | Dutch Friesian         | 13.8007 | 98.7007 | The Netherlands |
| Dutch belted6       | Dutch Friesian         | 11.5658 | 98.7093 | The Netherlands |
| Dutch belted7       | MRY                    | 14.1087 | 98.778  | The Netherlands |
| Dutch belted8       | MRY                    | 12.0641 | 98.6233 | The Netherlands |
| Dutch belted9       | Dutch Friesian         | 9.857   | 98.4598 | The Netherlands |
| Dutch belted10      | Dutch Friesian         | 10.2994 | 98.5135 | The Netherlands |
| Dutch belted11      | Groningen White Headed | 9.947   | 98.5482 | The Netherlands |
| Dutch belted12      | Dutch belted           | 10.3885 | 98.6488 | The Netherlands |
| Dutch belted13      | Groningen White Headed | 9.9901  | 98.686  | The Netherlands |
| Dutch belted14      | Groningen White Headed | 9.7639  | 98.5599 | The Netherlands |
| Dutch belted15      | Groningen White Headed | 10.7005 | 98.6897 | The Netherlands |
| Dutch belted16      | Groningen White Headed | 9.7785  | 98.4601 | The Netherlands |

|                    |                             |         |         |                 |
|--------------------|-----------------------------|---------|---------|-----------------|
| Dutch belted17     | Dutch belted                | 9.822   | 98.6726 | The Netherlands |
| Dutch belted18     | Dutch belted                | 12.4371 | 98.6998 | The Netherlands |
| Dutch belted19     | Groningen White Headed      | 9.9474  | 98.6178 | The Netherlands |
| Dutch belted20     | Deep Red (Deep red cattle 8 | 15.3363 | 98.7236 | The Netherlands |
| Dutch belted21     | Groningen White Headed      | 9.6197  | 98.5688 | The Netherlands |
| Dutch belted22     | Deep Red                    | 11.4765 | 98.7981 | The Netherlands |
| Dutch belted23     | Deep Red                    | 11.8649 | 98.7379 | The Netherlands |
| Dutch Friesian1    | Holstein Friesian           | 11.1292 | 98.5328 | The Netherlands |
| Dutch Friesian2    | Groningen White Headed      | 9.6747  | 98.7203 | The Netherlands |
| Dutch Friesian3    | Dutch belted                | 9.8323  | 98.4155 | The Netherlands |
| Dutch Friesian4    | Deep Red                    | 10.4887 | 98.7631 | The Netherlands |
| Dutch Friesian5    | MRY                         | 12.0799 | 98.6885 | The Netherlands |
| Dutch Friesian6    | Dutch Friesian              | 10.1151 | 98.4571 | The Netherlands |
| Dutch Friesian7    | Deep Red                    | 10.1802 | 98.6662 | The Netherlands |
| Dutch Friesian8    | Dutch belted                | 9.875   | 98.6296 | The Netherlands |
| Dutch Friesian9    | Dutch belted                | 9.7605  | 98.475  | The Netherlands |
| Dutch Friesian10   | Deep Red                    | 11.0918 | 98.7348 | The Netherlands |
| Dutch Friesian11   | MRY                         | 12.6911 | 98.7446 | The Netherlands |
| Dutch Friesian12   | Groningen White Headed      | 9.6446  | 98.6398 | The Netherlands |
| Dutch Friesian13   | MRY                         | 14.6297 | 98.76   | The Netherlands |
| Dutch Friesian14   | MRY                         | 12.4931 | 98.6768 | The Netherlands |
| Dutch Friesian15   | Groningen White Headed      | 11.7059 | 98.7327 | The Netherlands |
| Dutch Friesian16   | Dutch Friesian              | 9.77    | 98.6566 | The Netherlands |
| Dutch Friesian17   | Groningen White Headed      | 9.686   | 98.5596 | The Netherlands |
| Dutch Friesian18   | Deep Red                    | 9.782   | 98.6335 | The Netherlands |
| Dutch Friesian19   | Deep Red                    | 10.6327 | 98.7323 | The Netherlands |
| Dutch Friesian20   | Dutch belted                | 11.2589 | 98.629  | The Netherlands |
| Dutch Friesian21   | MRY                         | 11.9703 | 98.6801 | The Netherlands |
| Dutch Friesian22   | Holstein Friesian           | 13.2425 | 98.7548 | The Netherlands |
| Dutch Friesian23   | Dutch belted                | 10.6692 | 98.6972 | The Netherlands |
| Dutch Friesian24   | Dutch belted                | 10.6638 | 98.675  | The Netherlands |
| Groningen White    | Dutch belted                | 10.8002 | 98.6688 | The Netherlands |
| Groningen White    | Dutch belted                | 11.3377 | 98.6587 | The Netherlands |
| Groningen White    | Deep Red                    | 11.2345 | 98.7204 | The Netherlands |
| Groningen White    | Dutch belted                | 10.784  | 98.6372 | The Netherlands |
| Groningen White    | Dutch Friesian              | 9.7111  | 98.6468 | The Netherlands |
| Groningen White    | Dutch Friesian              | 9.6699  | 98.4631 | The Netherlands |
| Groningen White    | Dutch Friesian              | 9.6946  | 98.6778 | The Netherlands |
| Groningen White    | Deep Red                    | 10.0086 | 98.6602 | The Netherlands |
| Groningen White    | Dutch belted                | 9.6556  | 98.689  | The Netherlands |
| Groningen White    | MRY                         | 11.3982 | 98.6763 | The Netherlands |
| Groningen White    | Deep Red                    | 9.5111  | 98.5303 | The Netherlands |
| Groningen White    | Dutch belted                | 12.8099 | 98.654  | The Netherlands |
| Groningen White    | Dutch Friesian              | 9.5545  | 98.6237 | The Netherlands |
| Groningen White    | Dutch Friesian              | 10.2037 | 98.5986 | The Netherlands |
| Groningen White    | Dutch belted                | 9.8676  | 98.4695 | The Netherlands |
| Groningen White    | MRY                         | 11.4962 | 98.7082 | The Netherlands |
| Groningen White    | MRY                         | 13.7976 | 98.8029 | The Netherlands |
| Groningen White    | Dutch Friesian              | 10.048  | 98.65   | The Netherlands |
| Groningen White    | Deep Red                    | 10.4746 | 98.7019 | The Netherlands |
| Groningen White    | Dutch Friesian              | 12.2298 | 98.6927 | The Netherlands |
| Groningen White    | Groningen White Headed      | 9.6264  | 98.6535 | The Netherlands |
| Holstein Friesian1 | Deep Red                    | 11.5509 | 98.6268 | The Netherlands |
| Holstein Friesian2 | MRY                         | 13.0896 | 98.804  | The Netherlands |
| Holstein Friesian3 | Holstein Friesian           | 9.9256  | 98.6717 | The Netherlands |
| Holstein Friesian4 | Holstein Friesian           | 9.7538  | 98.6839 | The Netherlands |
| Holstein Friesian5 | Dutch Friesian              | 9.713   | 98.5195 | The Netherlands |
| MRY1               | Groningen White Headed      | 9.9167  | 98.6692 | The Netherlands |
| MRY2               | Groningen White Headed      | 9.5201  | 98.5859 | The Netherlands |
| MRY3               | Dutch Friesian              | 10.2056 | 98.613  | The Netherlands |
| MRY4               | Dutch Friesian              | 9.6289  | 98.4295 | The Netherlands |

|              |                        |         |         |                 |
|--------------|------------------------|---------|---------|-----------------|
| MRY5         | Groningen White Headed | 11.9162 | 98.5969 | The Netherlands |
| MRY6         | MRY                    | 13.0514 | 98.7991 | The Netherlands |
| MRY7         | Dutch belted           | 12.6025 | 98.7781 | The Netherlands |
| MRY8         | Deep Red               | 10.1445 | 98.5351 | The Netherlands |
| MRY9         | Deep Red               | 11.3332 | 98.6561 | The Netherlands |
| MRY10        | Dutch belted           | 9.7096  | 98.582  | The Netherlands |
| MRY11        | MRY                    | 13.1776 | 98.7522 | The Netherlands |
| MRY12        | MRY                    | 11.1762 | 98.728  | The Netherlands |
| MRY13        | MRY                    | 13.0654 | 98.8473 | The Netherlands |
| MRY14        | Deep Red               | 10.7364 | 98.6233 | The Netherlands |
| MRY15        | Deep Red               | 10.0284 | 98.5833 | The Netherlands |
| MRY16        | Deep Red               | 12.3486 | 98.7428 | The Netherlands |
| MRY17        | Groningen White Headed | 11.1957 | 98.7871 | The Netherlands |
| MRY18        | Dutch belted           | 11.0787 | 98.5243 | The Netherlands |
| MRY19        | Holstein Friesian      | 12.8478 | 98.8439 | The Netherlands |
| MRY20        | MRY                    | 10.8524 | 98.5933 | The Netherlands |
| MRY21        | Dutch Frisian          | 11.9948 | 98.6963 | The Netherlands |
| MRY22        | Deep Red               | 10.7293 | 98.6459 | The Netherlands |
| MRY23        | Groningen White Headed | 12.1352 | 98.7579 | The Netherlands |
| Barrosa1     | Barrosa                | 9.8692  | 98.5741 | Portugal        |
| Barrosa2     | Mertolenga             | 13.6256 | 98.7808 | Portugal        |
| Barrosa3     | Mirandesa              | 9.653   | 98.5653 | Portugal        |
| Barrosa4     | Mertolenga             | 11.8952 | 98.6066 | Portugal        |
| Barrosa5     | Mirandesa              | 10.9243 | 98.6005 | Portugal        |
| Barrosa6     | Mertolenga             | 9.8563  | 98.6463 | Portugal        |
| Barrosa7     | Mirandesa              | 10.3667 | 98.4752 | Portugal        |
| Barrosa8     | Barrosa                | 11.5397 | 98.5487 | Portugal        |
| Barrosa9     | Mirandesa              | 10.912  | 98.6267 | Portugal        |
| Barrosa10    | Holstein Friesian      | 11.0528 | 98.7229 | Portugal        |
| Barrosa11    | Barrosa                | 11.0432 | 98.6724 | Portugal        |
| Barrosa12    | Barrosa                | 11.4081 | 98.7147 | Portugal        |
| Barrosa13    | Mertolenga             | 10.0848 | 98.5983 | Portugal        |
| Barrosa14    | Mirandesa              | 11.6665 | 98.5575 | Portugal        |
| Barrosa15    | Mertolenga             | 10.6464 | 98.6179 | Portugal        |
| Barrosa16    | Holstein Friesian      | 9.1629  | 98.5374 | Portugal        |
| Barrosa17    | Mertolenga             | 10.3731 | 98.5845 | Portugal        |
| Barrosa18    | Barrosa                | 13.1415 | 98.7137 | Portugal        |
| Barrosa19    | Barrosa                | 9.6889  | 98.5911 | Portugal        |
| Barrosa20    | Barrosa                | 9.3076  | 98.6352 | Portugal        |
| Barrosa21    | Mertolenga             | 11.5707 | 98.6632 | Portugal        |
| Barrosa22    | Mertolenga             | 9.5964  | 98.6273 | Portugal        |
| Barrosa23    | Mirandesa              | 11.812  | 98.7257 | Portugal        |
| Barrosa24    | Mertolenga             | 10.5042 | 98.5037 | Portugal        |
| Barrosa25    | Mirandesa              | 11.6795 | 98.6806 | Portugal        |
| Barrosa26    | Barrosa                | 10.8197 | 98.593  | Portugal        |
| Barrosa27    | Mertolenga             | 11.1416 | 98.5907 | Portugal        |
| Barrosa28    | Barrosa                | 10.8693 | 98.7663 | Portugal        |
| Mertolenga1  | Barrosa                | 12.3486 | 98.7261 | Portugal        |
| Mertolenga2  | Mirandesa              | 10.5773 | 98.6654 | Portugal        |
| Mertolenga3  | Barrosa                | 12.0122 | 98.6825 | Portugal        |
| Mertolenga4  | Barrosa                | 11.0172 | 98.6298 | Portugal        |
| Mertolenga5  | Mertolenga             | 10.8716 | 98.6115 | Portugal        |
| Mertolenga6  | Mertolenga             | 13.3096 | 98.6896 | Portugal        |
| Mertolenga7  | Mertolenga             | 11.8944 | 98.766  | Portugal        |
| Mertolenga8  | Mirandesa              | 9.5045  | 98.6406 | Portugal        |
| Mertolenga9  | Barrosa                | 10.425  | 98.6656 | Portugal        |
| Mertolenga10 | Mirandesa              | 13.4222 | 98.7629 | Portugal        |
| Mertolenga11 | Barrosa                | 11.1931 | 98.6484 | Portugal        |
| Mertolenga12 | Mirandesa              | 10.0286 | 98.5653 | Portugal        |
| Mertolenga13 | Barrosa                | 10.1564 | 98.5883 | Portugal        |
| Mertolenga14 | Mertolenga             | 12.1925 | 98.6608 | Portugal        |

|                    |                  |         |         |          |
|--------------------|------------------|---------|---------|----------|
| Mertolenga15       | Mertolenga       | 11.8176 | 98.608  | Portugal |
| Mertolenga16       | Mirandesa        | 10.055  | 98.5178 | Portugal |
| Mertolenga17       | Barrosa          | 11.097  | 98.4629 | Portugal |
| Mertolenga18       | Holstein Frisian | 10.6409 | 98.7183 | Portugal |
| Mertolenga19       | Mirandesa        | 11.3077 | 98.6752 | Portugal |
| Mertolenga20       | Mertolenga       | 10.5042 | 98.6833 | Portugal |
| Mertolenga21       | Mirandesa        | 10.2692 | 98.5372 | Portugal |
| Mertolenga22       | Holstein Frisian | 12.2229 | 98.8533 | Portugal |
| Mertolenga23       | Holstein Frisian | 9.5618  | 98.5787 | Portugal |
| Mertolenga24       | Mirandesa        | 11.913  | 98.6095 | Portugal |
| Mertolenga25       | Barrosa          | 12.182  | 98.775  | Portugal |
| Mertolenga26       | Mirandesa        | 10.1563 | 98.6174 | Portugal |
| Mertolenga27       | Barrosa          | 11.2761 | 98.6401 | Portugal |
| Mertolenga28       | Barrosa          | 10.6851 | 98.6247 | Portugal |
| Mertolenga29       | Barrosa          | 10.3223 | 98.5862 | Portugal |
| Mirandesa1         | Mirandesa        | 10.4926 | 98.6011 | Portugal |
| Mirandesa2         | Mirandesa        | 10.9449 | 98.5838 | Portugal |
| Mirandesa3         | Mertolenga       | 11.7744 | 98.7088 | Portugal |
| Mirandesa4         | Mirandesa        | 13.2407 | 98.6798 | Portugal |
| Mirandesa5         | Mertolenga       | 10.0914 | 98.5558 | Portugal |
| Mirandesa6         | Mertolenga       | 9.6839  | 98.4953 | Portugal |
| Mirandesa7         | Mirandesa        | 13.9753 | 98.8109 | Portugal |
| Mirandesa8         | Mertolenga       | 10.771  | 98.663  | Portugal |
| Mirandesa9         | Barrosa          | 10.1757 | 98.5515 | Portugal |
| Mirandesa10        | Mertolenga       | 11.0495 | 98.6546 | Portugal |
| Mirandesa11        | Mertolenga       | 11.3077 | 98.6791 | Portugal |
| Mirandesa12        | Barrosa          | 11.1782 | 98.6534 | Portugal |
| Mirandesa13        | Barrosa          | 9.5926  | 98.4184 | Portugal |
| Mirandesa14        | Barrosa          | 10.1033 | 98.4921 | Portugal |
| Mirandesa15        | Mertolenga       | 11.5409 | 98.6592 | Portugal |
| Mirandesa16        | Mertolenga       | 11.1164 | 98.7297 | Portugal |
| Mirandesa17        | Mertolenga       | 10.4919 | 98.5229 | Portugal |
| Mirandesa18        | Mirandesa        | 10.9038 | 98.6308 | Portugal |
| Mirandesa19        | Mirandesa        | 10.1507 | 98.6255 | Portugal |
| Mirandesa20        | Mirandesa        | 11.3089 | 98.728  | Portugal |
| Mirandesa21        | Mirandesa        | 10.5741 | 98.5949 | Portugal |
| Mirandesa22        | Mirandesa        | 10.77   | 98.5472 | Portugal |
| Mirandesa23        | Barrosa          | 10.1047 | 98.5248 | Portugal |
| Mirandesa24        | Barrosa          | 11.6892 | 98.5163 | Portugal |
| Mirandesa25        | Mertolenga       | 10.5652 | 98.5565 | Portugal |
| Mirandesa26        | Mertolenga       | 12.4454 | 98.6773 | Portugal |
| Mirandesa27        | Mirandesa        | 10.7885 | 98.6645 | Portugal |
| Holstein Friesian1 | Barrosa          | 10.7919 | 98.5096 | Portugal |
| Holstein Friesian2 | Mertolenga       | 10.4751 | 98.6292 | Portugal |
| Holstein Friesian3 | Mirandesa        | 11.0501 | 98.6336 | Portugal |
| Holstein Friesian4 | Mertolenga       | 13.9852 | 98.7297 | Portugal |
| Holstein Friesian5 | Barrosa          | 14.2995 | 98.7017 | Portugal |

**Table S4. Post-QC mapping quality for individuals from different European local cattle breeds.**

| <b>OPTIBOVID</b>      | <b>Number of Mapped Reads (%)</b> | <b>Duplication Rate (%)</b> | <b>Mean Mapping Quality</b> |
|-----------------------|-----------------------------------|-----------------------------|-----------------------------|
| Eastern_Finncattle1   | 99.86                             | 5.41                        | 15.415                      |
| Eastern_Finncattle2   | 99.84                             | 5.15                        | 15.5814                     |
| Eastern_Finncattle3   | 99.87                             | 5.15                        | 15.4625                     |
| Eastern_Finncattle4   | 99.83                             | 5.24                        | 15.4557                     |
| Eastern_Finncattle5   | 99.84                             | 5.27                        | 15.6862                     |
| Eastern_Finncattle6   | 99.85                             | 5.16                        | 15.7556                     |
| Eastern_Finncattle7   | 99.83                             | 5.22                        | 15.7254                     |
| Eastern_Finncattle8   | 99.86                             | 5.22                        | 15.7025                     |
| Eastern_Finncattle9   | 99.8                              | 5.18                        | 15.4462                     |
| Eastern_Finncattle10  | 99.85                             | 5.56                        | 15.4691                     |
| Eastern_Finncattle11  | 99.83                             | 5.27                        | 15.4492                     |
| Eastern_Finncattle12  | 99.85                             | 5.62                        | 15.4816                     |
| Eastern_Finncattle13  | 99.86                             | 5.55                        | 15.5887                     |
| Eastern_Finncattle14  | 99.84                             | 5.56                        | 15.6379                     |
| Eastern_Finncattle15  | 99.81                             | 5.42                        | 15.5209                     |
| Eastern_Finncattle16  | 99.8                              | 5.28                        | 15.4706                     |
| Eastern_Finncattle17  | 99.85                             | 5.17                        | 15.5031                     |
| Eastern_Finncattle18  | 99.86                             | 5.35                        | 15.6455                     |
| Eastern_Finncattle19  | 99.82                             | 5.97                        | 15.4231                     |
| Eastern_Finncattle20  | 99.87                             | 5.69                        | 15.4333                     |
| Eastern_Finncattle21  | 99.79                             | 5.78                        | 15.5479                     |
| Eastern_Finncattle22  | 99.84                             | 5.8                         | 15.3374                     |
| Eastern_Finncattle23  | 99.84                             | 5.73                        | 15.481                      |
| Eastern_Finncattle24  | 99.73                             | 5.88                        | 15.51                       |
| Eastern_Finncattle25  | 99.85                             | 6.2                         | 15.5102                     |
| Western_Finncattle1   | 99.84                             | 5.19                        | 15.7177                     |
| Western_Finncattle2   | 99.87                             | 5.95                        | 15.3046                     |
| Western_Finncattle3   | 99.84                             | 5.25                        | 15.7468                     |
| Western_Finncattle4   | 99.85                             | 5.38                        | 15.7819                     |
| Western_Finncattle5   | 99.8                              | 5.19                        | 15.7707                     |
| Western_Finncattle6   | 99.84                             | 5.13                        | 15.7401                     |
| Western_Finncattle7   | 99.83                             | 5.23                        | 15.7375                     |
| Western_Finncattle8   | 99.84                             | 5.27                        | 15.842                      |
| Western_Finncattle9   | 99.82                             | 5.32                        | 15.7405                     |
| Western_Finncattle10  | 99.87                             | 5.27                        | 15.8562                     |
| Western_Finncattle11  | 99.84                             | 5.23                        | 15.7178                     |
| Western_Finncattle12  | 99.86                             | 5.2                         | 15.7491                     |
| Western_Finncattle13  | 99.8                              | 5.25                        | 15.8574                     |
| Western_Finncattle14  | 99.84                             | 5.2                         | 15.7264                     |
| Western_Finncattle15  | 99.84                             | 5.44                        | 15.6334                     |
| Western_Finncattle16  | 99.78                             | 5.28                        | 15.7025                     |
| Western_Finncattle17  | 99.81                             | 5.31                        | 15.7429                     |
| Western_Finncattle18  | 99.85                             | 5.21                        | 15.6212                     |
| Western_Finncattle19  | 99.83                             | 5.49                        | 15.731                      |
| Western_Finncattle20  | 99.83                             | 5.25                        | 15.6675                     |
| Western_Finncattle21  | 99.86                             | 5.2                         | 15.8695                     |
| Western_Finncattle22  | 99.79                             | 5.26                        | 15.7367                     |
| Western_Finncattle23  | 99.85                             | 5.51                        | 15.725                      |
| Western_Finncattle24  | 99.85                             | 5.46                        | 15.666                      |
| Western_Finncattle25  | 99.86                             | 5.88                        | 15.7387                     |
| Northern_Finncattle1  | 99.9                              | 5.34                        | 15.7784                     |
| Northern_Finncattle2  | 99.85                             | 5.16                        | 15.6732                     |
| Northern_Finncattle3  | 99.88                             | 5.11                        | 15.5746                     |
| Northern_Finncattle4  | 99.88                             | 5.28                        | 15.5219                     |
| Northern_Finncattle5  | 99.9                              | 5.45                        | 15.6674                     |
| Northern_Finncattle6  | 99.88                             | 5.31                        | 15.6863                     |
| Northern_Finncattle7  | 99.87                             | 5.1                         | 15.5871                     |
| Northern_Finncattle8  | 99.88                             | 5.57                        | 15.7415                     |
| Northern_Finncattle9  | 99.86                             | 5.43                        | 15.6385                     |
| Northern_Finncattle10 | 99.9                              | 5.27                        | 15.686                      |
| Northern_Finncattle11 | 99.89                             | 5.57                        | 15.5641                     |
| Northern_Finncattle12 | 99.82                             | 5.29                        | 15.4264                     |



|                       |       |      |         |
|-----------------------|-------|------|---------|
| Northern_Finncattle13 | 99.87 | 5.36 | 15.7143 |
| Northern_Finncattle14 | 99.88 | 5.19 | 15.6803 |
| Northern_Finncattle15 | 99.83 | 5.19 | 15.5991 |
| Northern_Finncattle16 | 99.87 | 5.1  | 15.527  |
| Northern_Finncattle17 | 99.85 | 5.29 | 15.4676 |
| Northern_Finncattle18 | 99.86 | 5.38 | 15.4438 |
| Northern_Finncattle19 | 99.85 | 5.13 | 15.6129 |
| Northern_Finncattle20 | 99.89 | 5.49 | 15.646  |
| Northern_Finncattle21 | 99.86 | 5.27 | 15.6893 |
| Northern_Finncattle22 | 99.85 | 5.37 | 15.6855 |
| Northern_Finncattle23 | 99.81 | 5.64 | 15.7527 |
| Northern_Finncattle24 | 99.88 | 5.67 | 15.7098 |
| Northern_Finncattle25 | 99.85 | 5.56 | 15.5466 |
| Holstein_Friesian1    | 99.88 | 5.2  | 15.7694 |
| Holstein_Friesian2    | 99.82 | 5.37 | 15.723  |
| Holstein_Friesian3    | 99.87 | 5.35 | 15.6036 |
| Holstein_Friesian4    | 99.84 | 5.26 | 15.6816 |
| Holstein_Friesian5    | 99.86 | 5.36 | 15.7963 |
| Deep_Red1             | 99.73 | 5.15 | 15.8248 |
| Deep_Red2             | 99.61 | 5.13 | 15.8477 |
| Deep_Red3             | 99.83 | 5.92 | 15.6899 |
| Deep_Red4             | 99.56 | 6.54 | 15.6916 |
| Deep_Red5             | 99.87 | 5.2  | 15.774  |
| Deep_Red6             | 99.59 | 5.73 | 15.3272 |
| Deep_Red7             | 99.82 | 5.48 | 15.7496 |
| Deep_Red8             | 99.37 | 5.75 | 15.6312 |
| Deep_Red9             | 99.33 | 5.26 | 15.5591 |
| Deep_Red10            | 99.68 | 5.31 | 15.856  |
| Deep_Red11            | 99.33 | 5.25 | 15.966  |
| Deep_Red12            | 99.87 | 5.22 | 15.7982 |
| Deep_Red13            | 99.68 | 5.14 | 15.8634 |
| Deep_Red14            | 99.64 | 5.06 | 15.926  |
| Deep_Red15            | 99.86 | 5.08 | 15.7209 |
| Deep_Red16            | 99.63 | 5.62 | 15.9915 |
| Deep_Red17            | 99.36 | 6.09 | 15.6545 |
| Deep_Red18            | 99.71 | 6.07 | 15.9573 |
| Deep_Red19            | 99.88 | 6.26 | 15.482  |
| Deep_Red20            | 99.15 | 5.31 | 15.857  |
| Deep_Red21            | 99.47 | 5.1  | 15.9455 |
| Deep_Red22            | 99.66 | 5.42 | 15.76   |
| Deep_Red23            | 99.63 | 5.18 | 15.9012 |
| Deep_Red24            | 99.66 | 5.43 | 15.7938 |
| Dutch_belted1         | 99.5  | 5.27 | 15.9211 |
| Dutch_belted2         | 99.33 | 5.68 | 15.6453 |
| Dutch_belted3         | 99.3  | 5.84 | 15.7864 |
| Dutch_belted4         | 99.87 | 5.7  | 15.63   |
| Dutch_belted5         | 99.68 | 5.44 | 15.9468 |
| Dutch_belted6         | 99.46 | 5.32 | 15.7578 |
| Dutch_belted7         | 99.83 | 5.12 | 15.8167 |
| Dutch_belted8         | 99.45 | 5.23 | 16.045  |
| Dutch_belted9         | 99.59 | 5.11 | 15.8176 |
| Dutch_belted10        | 99.33 | 6.01 | 15.6507 |
| Dutch_belted11        | 99.57 | 5.38 | 15.6683 |
| Dutch_belted12        | 99.63 | 5.18 | 15.7361 |
| Dutch_belted13        | 99.71 | 5.2  | 15.9493 |
| Dutch_belted14        | 99.86 | 5.7  | 15.9437 |
| Dutch_belted15        | 99.62 | 5.43 | 15.9203 |
| Dutch_belted16        | 99.68 | 5.1  | 15.8538 |
| Dutch_belted17        | 99.4  | 5.45 | 15.7349 |
| Dutch_belted18        | 99.86 | 5.11 | 15.5127 |
| Dutch_belted19        | 99.83 | 5.65 | 15.4851 |
| Dutch_belted20        | 99.66 | 5.08 | 15.9944 |
| Dutch_belted21        | 99.86 | 5.35 | 15.6661 |
| Dutch_belted22        | 99.58 | 5.37 | 15.705  |

|                          |       |      |         |
|--------------------------|-------|------|---------|
| Dutch_belted23           | 99.81 | 6.01 | 15.6597 |
| Dutch_Friesian1          | 99.46 | 6.18 | 15.6647 |
| Dutch_Friesian2          | 99.66 | 5.45 | 15.8434 |
| Dutch_Friesian3          | 99.21 | 5.21 | 15.7993 |
| Dutch_Friesian4          | 99.31 | 5.2  | 15.8047 |
| Dutch_Friesian5          | 99.84 | 5.5  | 15.7836 |
| Dutch_Friesian6          | 99.67 | 5.45 | 15.6429 |
| Dutch_Friesian7          | 99.75 | 5.1  | 15.6362 |
| Dutch_Friesian8          | 99.59 | 5.43 | 15.9297 |
| Dutch_Friesian9          | 99.63 | 5.73 | 15.7994 |
| Dutch_Friesian10         | 99.87 | 5.37 | 15.7774 |
| Dutch_Friesian11         | 99.13 | 5.1  | 15.7411 |
| Dutch_Friesian12         | 99.86 | 5.17 | 15.7555 |
| Dutch_Friesian13         | 99.32 | 6.24 | 15.8163 |
| Dutch_Friesian14         | 99.63 | 5.18 | 15.8433 |
| Dutch_Friesian15         | 99.63 | 5.05 | 15.9167 |
| Dutch_Friesian16         | 99.85 | 5.73 | 15.6399 |
| Dutch_Friesian17         | 99.87 | 5.41 | 15.8199 |
| Dutch_Friesian18         | 99.85 | 5.49 | 15.6299 |
| Dutch_Friesian19         | 99.58 | 5.61 | 15.6411 |
| Dutch_Friesian20         | 99.72 | 5.43 | 15.7059 |
| Dutch_Friesian21         | 99.47 | 5.14 | 15.7778 |
| Dutch_Friesian22         | 99.82 | 5.55 | 15.4702 |
| Dutch_Friesian23         | 99.53 | 6.77 | 15.5186 |
| Dutch_Friesian24         | 99.86 | 5.46 | 15.848  |
| Groningen_White_Headed1  | 99.34 | 5.14 | 15.8529 |
| Groningen_White_Headed2  | 99.84 | 5.11 | 15.8039 |
| Groningen_White_Headed3  | 99.57 | 5.64 | 15.6951 |
| Groningen_White_Headed4  | 99.86 | 5.35 | 15.6045 |
| Groningen_White_Headed5  | 99.82 | 5.23 | 15.7428 |
| Groningen_White_Headed6  | 99.85 | 5.45 | 15.5838 |
| Groningen_White_Headed7  | 99.83 | 5.2  | 15.804  |
| Groningen_White_Headed8  | 99.53 | 5.19 | 15.8821 |
| Groningen_White_Headed9  | 99.59 | 5.47 | 15.6751 |
| Groningen_White_Headed10 | 99.88 | 5.93 | 15.6804 |
| Groningen_White_Headed11 | 99.35 | 5.3  | 16.0189 |
| Groningen_White_Headed12 | 99.68 | 5.76 | 15.7463 |
| Groningen_White_Headed13 | 99.66 | 6.27 | 15.5704 |
| Groningen_White_Headed14 | 99.85 | 5.37 | 15.5894 |
| Groningen_White_Headed15 | 99.36 | 5.86 | 15.8616 |
| Groningen_White_Headed16 | 99.46 | 5.22 | 15.6482 |
| Groningen_White_Headed17 | 99.86 | 5.9  | 15.6503 |
| Groningen_White_Headed18 | 99.7  | 5.25 | 15.6305 |
| Groningen_White_Headed19 | 84.97 | 4.92 | 15.8346 |
| Groningen_White_Headed20 | 99.86 | 5.9  | 15.7728 |
| Groningen_White_Headed21 | 99.45 | 5.21 | 15.8517 |
| Holstein_Friesian1       | 99.68 | 5.14 | 15.7707 |
| Holstein_Friesian2       | 99.7  | 5.64 | 15.763  |
| Holstein_Friesian3       | 99.68 | 5.21 | 15.839  |
| Holstein_Friesian4       | 99.72 | 5.15 | 15.9316 |
| Holstein_Friesian5       | 99.68 | 5.09 | 15.8518 |
| MRY1                     | 99.37 | 5.31 | 15.7    |
| MRY2                     | 99.49 | 5.22 | 15.8612 |
| MRY3                     | 99.68 | 5.25 | 15.8605 |
| MRY4                     | 99.71 | 5.31 | 15.726  |
| MRY5                     | 99.68 | 5.06 | 15.7687 |
| MRY6                     | 99.88 | 5.58 | 15.3991 |
| MRY7                     | 99.85 | 5.47 | 15.6694 |
| MRY8                     | 99.34 | 5.45 | 15.8236 |
| MRY9                     | 99.65 | 5.15 | 15.752  |
| MRY10                    | 99.74 | 5.19 | 15.89   |
| MRY11                    | 99.87 | 5.26 | 15.8482 |
| MRY12                    | 99.68 | 5.22 | 16.0348 |
| MRY13                    | 99.66 | 5.04 | 15.9341 |

|              |       |      |         |
|--------------|-------|------|---------|
| MRY14        | 99.56 | 5.45 | 15.6085 |
| MRY15        | 99.52 | 5.49 | 15.7491 |
| MRY16        | 99.83 | 5.57 | 15.8255 |
| MRY17        | 99.58 | 5.49 | 15.8443 |
| MRY18        | 99.63 | 5.69 | 15.4936 |
| MRY19        | 99.64 | 5.26 | 15.7585 |
| MRY20        | 99.5  | 5.17 | 15.9665 |
| MRY21        | 99.84 | 5.9  | 15.7069 |
| MRY22        | 99.35 | 5.44 | 15.78   |
| MRY23        | 99.87 | 5.76 | 15.6062 |
| Barrosa1     | 99.74 | 5.36 | 15.752  |
| Barrosa2     | 99.86 | 6.36 | 15.5019 |
| Barrosa3     | 99.89 | 5.31 | 15.5975 |
| Barrosa4     | 99.56 | 5.97 | 15.388  |
| Barrosa5     | 99.54 | 5.59 | 15.5348 |
| Barrosa6     | 99.85 | 5.42 | 15.6842 |
| Barrosa7     | 99.53 | 5.36 | 15.6048 |
| Barrosa8     | 99.47 | 6.16 | 15.4294 |
| Barrosa9     | 99.89 | 5.71 | 15.459  |
| Barrosa10    | 99.83 | 5.32 | 15.6509 |
| Barrosa11    | 99.87 | 5.67 | 15.6501 |
| Barrosa12    | 99.52 | 5.86 | 15.5783 |
| Barrosa13    | 99.82 | 5.54 | 15.5058 |
| Barrosa14    | 99.52 | 5.71 | 15.462  |
| Barrosa15    | 99.55 | 5.65 | 15.6396 |
| Barrosa16    | 99.78 | 4.9  | 15.6922 |
| Barrosa17    | 99.55 | 5.61 | 15.5369 |
| Barrosa18    | 99.82 | 6.74 | 15.5617 |
| Barrosa19    | 99.83 | 5.07 | 15.7448 |
| Barrosa20    | 99.79 | 5.69 | 15.6787 |
| Barrosa21    | 99.49 | 5.8  | 15.6468 |
| Barrosa22    | 99.87 | 5.29 | 15.5639 |
| Barrosa23    | 99.88 | 6.02 | 15.7284 |
| Barrosa24    | 99.55 | 5.7  | 15.547  |
| Barrosa25    | 99.86 | 5.9  | 15.5394 |
| Barrosa26    | 99.4  | 5.81 | 15.6551 |
| Barrosa27    | 99.85 | 5.67 | 15.5502 |
| Barrosa28    | 99.82 | 5.64 | 15.8434 |
| Mertolenga1  | 99.85 | 5.96 | 15.6371 |
| Mertolenga2  | 99.87 | 5.55 | 15.6301 |
| Mertolenga3  | 99.65 | 5.75 | 15.7019 |
| Mertolenga4  | 99.51 | 5.82 | 15.6238 |
| Mertolenga5  | 99.83 | 5.69 | 15.4491 |
| Mertolenga6  | 99.57 | 6.36 | 15.3703 |
| Mertolenga7  | 99.83 | 5.96 | 15.5752 |
| Mertolenga8  | 99.87 | 5.68 | 15.6886 |
| Mertolenga9  | 99.85 | 5.48 | 15.695  |
| Mertolenga10 | 99.86 | 6.31 | 15.4701 |
| Mertolenga11 | 99.82 | 5.45 | 15.6149 |
| Mertolenga12 | 99.53 | 5.32 | 15.6803 |
| Mertolenga13 | 99.76 | 5.08 | 15.6507 |
| Mertolenga14 | 99.55 | 6.08 | 15.6223 |
| Mertolenga15 | 99.58 | 5.94 | 15.4735 |
| Mertolenga16 | 99.57 | 5.56 | 15.558  |
| Mertolenga17 | 99.47 | 5.57 | 15.251  |
| Mertolenga18 | 99.87 | 5.24 | 15.7303 |
| Mertolenga19 | 99.87 | 5.78 | 15.7172 |
| Mertolenga20 | 99.84 | 5.64 | 15.5395 |
| Mertolenga21 | 99.55 | 5.52 | 15.6639 |
| Mertolenga22 | 99.85 | 5.55 | 15.7013 |
| Mertolenga23 | 99.83 | 5.04 | 15.6253 |
| Mertolenga24 | 99.55 | 6.15 | 15.3134 |
| Mertolenga25 | 99.78 | 6.1  | 15.6669 |
| Mertolenga26 | 99.88 | 5.47 | 15.4829 |

|                    |       |      |         |
|--------------------|-------|------|---------|
| Mertolenga27       | 99.83 | 5.86 | 15.6069 |
| Mertolenga28       | 99.51 | 5.43 | 15.6421 |
| Mertolenga29       | 99.86 | 5.53 | 15.8523 |
| Mirandesa1         | 99.58 | 5.66 | 15.5066 |
| Mirandesa2         | 99.55 | 5.53 | 15.6252 |
| Mirandesa3         | 99.78 | 6.02 | 15.5799 |
| Mirandesa4         | 99.52 | 6.38 | 15.552  |
| Mirandesa5         | 99.53 | 5.53 | 15.5866 |
| Mirandesa6         | 99.59 | 5.66 | 15.5851 |
| Mirandesa7         | 99.86 | 6.51 | 15.5904 |
| Mirandesa8         | 99.77 | 5.7  | 15.6954 |
| Mirandesa9         | 99.28 | 5.35 | 15.5806 |
| Mirandesa10        | 99.73 | 5.74 | 15.4301 |
| Mirandesa11        | 99.84 | 5.88 | 15.4565 |
| Mirandesa12        | 99.35 | 5.53 | 15.6389 |
| Mirandesa13        | 99.51 | 5.06 | 15.6326 |
| Mirandesa14        | 99.49 | 5.56 | 15.5423 |
| Mirandesa15        | 99.9  | 5.81 | 15.643  |
| Mirandesa16        | 99.84 | 5.85 | 15.7558 |
| Mirandesa17        | 99.79 | 5.66 | 15.292  |
| Mirandesa18        | 99.56 | 5.71 | 15.5051 |
| Mirandesa19        | 99.85 | 5.49 | 15.5947 |
| Mirandesa20        | 99.86 | 5.85 | 15.7649 |
| Mirandesa21        | 99.86 | 5.61 | 15.4331 |
| Mirandesa22        | 99.55 | 5.51 | 15.5181 |
| Mirandesa23        | 99.43 | 5.34 | 15.6542 |
| Mirandesa24        | 99.52 | 5.95 | 15.6203 |
| Mirandesa25        | 99.6  | 5.6  | 15.5903 |
| Mirandesa26        | 99.88 | 6.07 | 15.6339 |
| Mirandesa27        | 99.85 | 5.61 | 15.6139 |
| Holstein Friesian1 | 99.51 | 5.44 | 15.6048 |
| Holstein Friesian2 | 99.56 | 5.61 | 15.663  |
| Holstein Friesian3 | 99.86 | 5.83 | 15.4566 |
| Holstein Friesian4 | 99.53 | 6.5  | 15.3823 |
| Holstein Friesian5 | 99.48 | 6.6  | 15.6393 |

**Table S5. Distribution of variants' types and protein-coding variants from European cattle breeds.**

| <b>SNP types</b>                    |                         |                              |
|-------------------------------------|-------------------------|------------------------------|
| <b>Consequence type</b>             | <b>Count on raw VCF</b> | <b>Count on filtered VCF</b> |
| upstream_gene_variant               | 2,534,901               | 1,139,316                    |
| synonymous_variant                  | 385,255                 | 117,044                      |
| stop_retained_variant               | 232                     | 106                          |
| stop_lost                           | 366                     | 160                          |
| stop_gained                         | 3,106                   | 1059                         |
| start_retained_variant              | 9                       | 6                            |
| start_lost                          | 531                     | 237                          |
| splice_region_variant               | 42,421                  | 18,040                       |
| splice_polypyrimidine_tract_variant | 58,807                  | 26,777                       |
| splice_donor_variant                | 1,243                   | 485                          |
| splice_donor_region_variant         | 7,468                   | 3269                         |
| splice_donor_5th_base_variant       | 2,015                   | 729                          |
| splice_acceptor_variant             | 964                     | 416                          |
| protein_altering_variant            | 190                     | 118                          |
| non_coding_transcript_variant       | 551,799                 | 245,682                      |
| non_coding_transcript_exon_variant  | 40,022                  | 17,188                       |
| missense_variant                    | 251,333                 | 89112                        |
| mature_miRNA_variant                | 187                     | 64                           |
| intron_variant                      | 25,009,012              | 11,242,879                   |
| intergenic_variant                  | 19,755,993              | 9,170,898                    |
| inframe_insertion                   | 1,148                   | 521                          |
| inframe_deletion                    | 2,035                   | 724                          |
| frameshift_variant                  | 4,607                   | 2,055                        |
| downstream_gene_variant             | 2,589,446               | 1,142,780                    |
| coding_sequence_variant             | 361                     | 197                          |
| 5_prime_UTR_variant                 | 70,654                  | 29,080                       |
| 3_prime_UTR_variant                 | 190,529                 | 78,750                       |

| <b>Protein-coding SNPs</b> |                         |                              |
|----------------------------|-------------------------|------------------------------|
| <b>Consequence type</b>    | <b>Count on raw VCF</b> | <b>Count on filtered VCF</b> |
| synonymous_variant         | 385,255                 | 117,044                      |
| stop_retained_variant      | 232                     | 106                          |
| stop_lost                  | 366                     | 160                          |
| stop_gained                | 3,106                   | 1,059                        |
| start_retained_variant     | 9                       | 6                            |
| start_lost                 | 531                     | 237                          |
| protein_altering_variant   | 190                     | 118                          |
| missense_variant           | 251,333                 | 89,112                       |
| inframe_insertion          | 1,148                   | 521                          |
| inframe_deletion           | 2,035                   | 724                          |
| frameshift_variant         | 4,607                   | 2,055                        |
| coding_sequence_variant    | 361                     | 197                          |