

Table S1. Details of breeds, management, number of lactating goats and mean year-long milk production.

| Farm | Breed | Management | Lactating goats | Milk Production (Kg/day) |
|-------------|---|-------------------|------------------------|---------------------------------|
| 1 | Chamos Coloured, Saanen,crossbreed | intensive | 131 | 2.8 |
| 2 | Chamois Coloured, Roccaverano | semi-intensive | 115 | 3.16 |
| 3 | Chamois Coloured, Roccaverano | semi-intensive | 120 | 3.4 |
| 4 | Chamois Coloured | intensive | 65 | 4 |
| 5 | Murciana | semi-intensive | 30 | 2 |
| 6 | Chamois Coloured | intensive | 130 | 2.4 |
| 7 | Saanen | intensive | 44 | 3 |
| 8 | Saanen, Nubiana, crossbreed | intensive | 34 | 3.6 |
| 9 | Saanen | intensive | 83 | 3 |
| 10 | Saanen | intensive | 210 | 2.9 |
| 11 | Chamois Coloured | intensive | 38 | 2.94 |
| 12 | Chamois Coloured | intensive | 135 | 2.5 |
| 13 | crossbreed | intensive | 45 | 3 |
| 14 | Saanen, crossbreed | intensive | 130 | 1.6 |
| 15 | Chamois Coloured, Roccaverano | intensive | 250 | 3.26 |
| 16 | Chamois Coloured, Saanen, Nera Verzasca | semi-intensive | 182 | 2.1 |
| 17 | Chamois Coloured, Roccaverano | semi-intensive | 80 | 2.9 |
| 18 | Chamois Coloured | intensive | 66 | 2.7 |
| 19 | Chamois Coloured | intensive | 40 | 3 |
| 20 | Chamois Coloured, Saanen, crossbreed | intensive | 280 | 2.6 |
| 21 | Chamois Coloured, Saanen | intensive | 140 | 4.7 |
| 22 | Saanen | intensive | 120 | 2.2 |
| 23 | Murciana | intensive | 70 | 2.2 |
| 24 | Chamois Coloured | semi-intensive | 20 | 1.6 |
| 25 | Chamois Coloured, Roccaverano | semi-intensive | 110 | 3.17 |
| 26 | Saanen | intensive | 60 | 4 |
| 27 | Chamois Coloured | intensive | 65 | 1.7 |
| 28 | Chamois Coloured, Saanen | intensive | 153 | 3.8 |
| 29 | Saanen | intensive | 138 | 2.9 |
| 30 | Chamois Coloured | intensive | 47 | 2.3 |
| 31 | Chamois Coloured | semi-intensive | 34 | 2 |
| 32 | Saanen | intensive | 47 | 3.3 |
| 33 | Saanen | intensive | 75 | 3.1 |

Table S2. Statistical analysis of the indicators from the animal welfare and biosecurity assessment associated with paratuberculosis seropositivity. Statistical analysis was not applicable when the same score was assigned to all the flocks.

| Indicators | Score | Flocks (N) | Positive Flocks | Statistical Analysis |
|--|--------------|------------|-----------------|---------------------------------------|
| Welfare Area A | | | | |
| Number of stockpersons | excellent | 17 | 9 | $\chi^2 = 1.22$ p -value = 0.543 |
| | acceptable | 11 | 6 | |
| | insufficient | 5 | 4 | |
| Experience and training of stockpersons | excellent | 15 | 8 | $\chi^2 = 2.95$ p -value = 0.229 |
| | acceptable | 14 | 10 | |
| | insufficient | 4 | 1 | |
| Animal grouping strategy | excellent | 18 | 7 | $\chi^2 = 6.51$ p -value = 0.039 |
| | acceptable | 13 | 11 | |
| | insufficient | 2 | 1 | |
| Inspection of the animals | excellent | 16 | 6 | $\chi^2 = 3.65$ p -value = 0.056 |
| | acceptable | 17 | 13 | |
| | insufficient | 0 | 0 | |
| Management of sick or injured animals | acceptable | 33 | 19 | Not applicable |
| | insufficient | 0 | 0 | |
| Feeding strategy | excellent | 22 | 10 | $\chi^2 = 2.62$ p -value = 0.105 |
| | acceptable | 11 | 9 | |
| | insufficient | 0 | 0 | |
| Water provision | excellent | 22 | 12 | $\chi^2 = 0.02$ p -value = 0.901 |
| | acceptable | 11 | 7 | |
| | insufficient | 0 | 0 | |
| Cleanliness of water points | excellent | 10 | 6 | $\chi^2 = 0.71$ p -value = 0.701 |
| | acceptable | 19 | 10 | |
| | insufficient | 4 | 3 | |
| Cleanliness and hygiene of floor in walking areas and of bedding | excellent | 16 | 6 | $\chi^2 = 5.37$ p -value = 0.068 |
| | acceptable | 16 | 12 | |
| | insufficient | 1 | 1 | |
| Hygiene of milking procedures | excellent | 17 | 8 | $\chi^2 = 2.42$ p -value = 0.298 |
| | acceptable | 10 | 6 | |
| | insufficient | 6 | 5 | |
| Biosecurity measures | excellent | 13 | 5 | $\chi^2 = 3.6$ p -value = 0.166 |
| | acceptable | 19 | 13 | |
| | insufficient | 1 | 1 | |
| Area B | | | | |
| Building and animal housing | acceptable | 33 | 19 | Not applicable |
| | insufficient | 0 | 0 | |
| Presence of shelters in outdoor areas | excellent | 4 | 1 | $\chi^2 = 0.75$ p -value = 0.386 |
| | acceptable | 29 | 18 | |
| | insufficient | 0 | 0 | |
| Type of housing | excellent | 17 | 8 | $\chi^2 = 0.82$ p -value = 0.364 |
| | acceptable | 16 | 11 | |
| | insufficient | 0 | 0 | |
| Space availability in lying area (adult goats) | excellent | 7 | 2 | $\chi^2 = 3.08$ |

| | | | | |
|---|--------------|----|----|--------------------|
| | acceptable | 15 | 10 | p -value = 0.214 |
| | insufficient | 11 | 7 | |
| Space availability in lying area (young goats) | excellent | 11 | 5 | $\chi^2 = 4.64$ |
| | acceptable | 20 | 14 | p -value = 0.098 |
| | insufficient | 2 | 0 | |
| Space availability in lying area (bucks) | excellent | 3 | 1 | $\chi^2 = 0.88$ |
| | acceptable | 28 | 17 | p -value = 0.643 |
| | insufficient | 2 | 1 | |
| Space availability in lying area and feed bunk dimension (kids) | excellent | 7 | 3 | $\chi^2 = 0.91$ |
| | acceptable | 24 | 15 | p -value = 0.636 |
| | insufficient | 2 | 1 | |
| Feeding place dimension and accessibility | excellent | 8 | 3 | $\chi^2 = 2.12$ |
| | acceptable | 21 | 14 | p -value = 0.346 |
| | insufficient | 4 | 2 | |
| Functioning and number of water points | excellent | 10 | 6 | $\chi^2 = 0.21$ |
| | acceptable | 15 | 8 | p -value = 0.899 |
| | insufficient | 8 | 5 | |
| Facilities for sick animals | excellent | 6 | 2 | $\chi^2 = 3.76$ |
| | acceptable | 14 | 7 | p -value = 0.152 |
| | insufficient | 13 | 10 | |
| Milking machine or robot maintenance | excellent | 22 | 13 | $\chi^2 = 0$ |
| | acceptable | 11 | 6 | p -value = 1 |
| | insufficient | 0 | 0 | |
| Temperature and humidity | excellent | 3 | 2 | $\chi^2 = 0.15$ |
| | acceptable | 28 | 16 | p -value = 0.927 |
| | insufficient | 2 | 1 | |
| Lighting | acceptable | 33 | 19 | Not applicable |
| | insufficient | 0 | 0 | |
| Area C | | | | |
| First-contact latency test | excellent | 28 | 15 | $\chi^2 = 1.42$ |
| | acceptable | 4 | 3 | p -value = 0.492 |
| | insufficient | 1 | 1 | |
| Isolated animals, staring into space and estranged from the environment | excellent | 33 | 19 | $\chi^2 = 0.76$ |
| | acceptable | 0 | 0 | p -value = 0.384 |
| | insufficient | 0 | 0 | |
| Body condition score | excellent | 26 | 13 | $\chi^2 = 2.98$ |
| | acceptable | 6 | 5 | p -value = 0.226 |
| | insufficient | 1 | 1 | |
| Cleanliness of the animals | excellent | 27 | 15 | $\chi^2 = 2.43$ |
| | acceptable | 5 | 4 | p -value = 0.296 |
| | insufficient | 1 | 0 | |
| Integument alterations | excellent | 19 | 9 | $\chi^2 = 3.08$ |
| | acceptable | 7 | 6 | p -value = 0.214 |
| | insufficient | 7 | 4 | |
| Lameness | excellent | 30 | 17 | $\chi^2 = 0.79$ |
| | acceptable | 1 | 1 | p -value = 0.672 |
| | insufficient | 2 | 1 | |
| Overgrown claws | excellent | 16 | 9 | $\chi^2 = 0.5$ |
| | acceptable | 9 | 6 | p -value = 0.777 |

| | | | | |
|---|--------------|----|----|--------------------------|
| | insufficient | 8 | 4 | |
| Abscesses | excellent | 12 | 7 | $\chi^2 = 0.16$ |
| | acceptable | 8 | 5 | $p\text{-value} = 0.925$ |
| | insufficient | 13 | 7 | |
| Udder asymmetries | excellent | 19 | 11 | $\chi^2 = 0$ |
| | acceptable | 7 | 4 | $p\text{-value} = 0.999$ |
| | insufficient | 7 | 4 | |
| Annual mortality rate (adult goats) | excellent | 9 | 4 | $\chi^2 = 6.18$ |
| | acceptable | 14 | 6 | $p\text{-value} = 0.045$ |
| | insufficient | 10 | 9 | |
| Annual mortality rate (kids) | excellent | 15 | 6 | $\chi^2 = 4.54$ |
| | acceptable | 7 | 4 | $p\text{-value} = 0.103$ |
| | insufficient | 11 | 9 | |
| Mutilations | excellent | 10 | 5 | $\chi^2 = 0.04$ |
| | acceptable | 23 | 14 | $p\text{-value} = 0.844$ |
| | insufficient | 0 | 0 | |
| Biosecurity | | | | |
| Measures for rodent and insect fighting | excellent | 5 | 2 | $\chi^2 = 0.79$ |
| | acceptable | 25 | 15 | $p\text{-value} = 0.672$ |
| | insufficient | 3 | 2 | |
| Contact with other animal species | excellent | 12 | 4 | $\chi^2 = 11.64$ |
| | acceptable | 5 | 1 | $p\text{-value} = 0.003$ |
| | insufficient | 16 | 14 | |
| Measures for preventing the entrance of strangers | excellent | 4 | 2 | $\chi^2 = 9.25$ |
| | acceptable | 20 | 8 | $p\text{-value} = 0.01$ |
| | insufficient | 9 | 9 | |
| Measures for monitoring the entrance of regular visitors | excellent | 2 | 1 | $\chi^2 = 0.85$ |
| | acceptable | 26 | 16 | $p\text{-value} = 0.655$ |
| | insufficient | 5 | 2 | |
| Disinfection of vehicles entering the farm | excellent | 1 | 1 | $\chi^2 = 0.77$ |
| | acceptable | 18 | 10 | $p\text{-value} = 0.681$ |
| | insufficient | 14 | 8 | |
| Indirect-direct contacts between own animals and outside vehicles | acceptable | 16 | 8 | $\chi^2 = 0.25$ |
| | insufficient | 17 | 11 | $p\text{-value} = 0.616$ |
| Collection disposal of fallen stock (dead livestock) | acceptable | 24 | 12 | $\chi^2 = 1.09$ |
| | insufficient | 9 | 7 | $p\text{-value} = 0.297$ |
| Loading of live animals | acceptable | 21 | 13 | $\chi^2 = 0.09$ |
| | insufficient | 12 | 6 | $p\text{-value} = 0.765$ |
| Purchase and/or movement of animals to outside the farm | excellent | 11 | 5 | $\chi^2 = 1.02$ |
| | acceptable | 16 | 10 | $p\text{-value} = 0.599$ |
| | insufficient | 6 | 4 | |
| Quarantine measures | excellent | 12 | 6 | $\chi^2 = 2.07$ |
| | acceptable | 12 | 6 | $p\text{-value} = 0.356$ |
| | insufficient | 9 | 7 | |
| Control and prevention of major infectious diseases | excellent | 14 | 7 | $\chi^2 = 1.81$ |
| | acceptable | 17 | 10 | $p\text{-value} = 0.404$ |
| | insufficient | 2 | 2 | |
| Health monitoring activities | acceptable | 26 | 14 | $\chi^2 = 0.16$ |
| | insufficient | 7 | 5 | $p\text{-value} = 0.686$ |

| | | | | |
|--|--------------|----|----|---|
| Control and prevention of mammary infections | excellent | 14 | 8 | $\chi^2 = 0.89$ $p\text{-value} = 0.64$ |
| | acceptable | 14 | 9 | |
| | insufficient | 5 | 2 | |
| Control and prevention of endo/ectoparasitosis | excellent | 24 | 13 | $\chi^2 = 0.06$ $p\text{-value} = 0.801$ |
| | acceptable | 9 | 6 | |
| | insufficient | 0 | 0 | |
| Monitoring and analysis of water sources | excellent | 31 | 18 | $\chi^2 = 0$ $p\text{-value} = 1$ |
| | acceptable | 0 | 0 | |
| | insufficient | 2 | 1 | |