Extensive countrywide field investigation of somatic cell counts and total bacterial counts in bulk tank raw milk in goat herds in Greece

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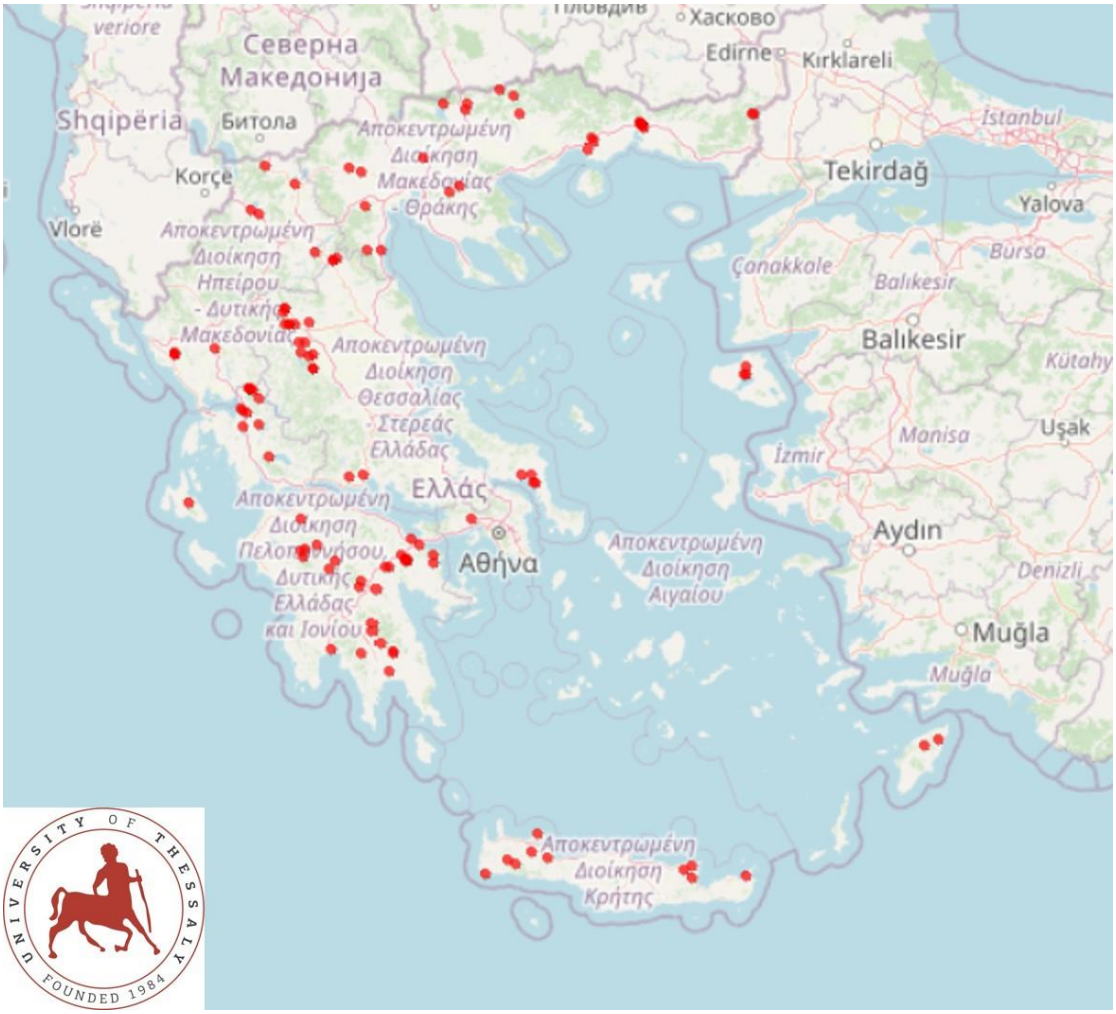
Supplementary material 1. Location of 119 goat herds around Greece, which were visited for bulk-tank sampling.



Supplementary material 2. Details of the data management and analysis performed during the study.

Data management

During cell counting, total bacterial counting and milk composition measurement, for each bulk-tank milk sample, the results of the two sub-samples from each sample were averaged and then, the two means were again averaged for the final result regarding each bulk-tank milk. During body condition scoring, scores of the 25 goats evaluated in each herd were averaged.

The results of testing for biofilm formation by the staphylococcal strains obtained by each method, were assessed by using the methodology detailed by Vasileiou *et al.* (2018). Subsequently, results of the two methods (culture appearance on Congo Red agar and microplate adhesion) were combined (Vasileiou *et al.*, 2018) and staphylococcal strains were characterised as biofilm-forming or non biofilm-forming.

For evaluation of the significance of increased SCC, the 0.75×10^6 cells mL^{-1} threshold was used. For evaluation of the significance of increased TBC, the 1500×10^3 cfu mL^{-1} threshold was used.

Statistical analysis

Data were entered into Microsoft Excel and analysed using SPSS v. 21 (IBM Analytics, Armonk, USA). Basic descriptive analysis was performed. Exact binomial confidence intervals were obtained, if appropriate. For all statistical analyses, SCC and TBC were transformed to $\log_{10}$ and the log-transformed data were used in the analyses; then, for presentation of the results, the log-transformed findings were back-transformed into 10^{log} data.

In total, 53 or 58 variables (related to infrastructure, animals, production characteristics, health management and human resources in the herd) were evaluated for potential association with, respectively, SCC or TBC in the bulk-tank milk of these herds (Supplementary material 3); these were either taken directly from the answers of the interview performed at the start of the visit or calculated based on these answers. For each of these variables, categories were created according to the answers of the farmers. Initially, SCC or TBC in the bulk-tank milk from the herds were compared between the categories of each variable by using one-way analysis of variance.

The outcomes of '*increased SCC in bulk-tank milk*' (i.e., with SCC above the threshold of 0.75×10^6 cells mL^{-1}) and '*increased TBC in bulk-tank milk*' (i.e., with TBC above the threshold of 1500×10^3 cfu mL^{-1}) were considered. Exact binomial CI were obtained. Initially, the importance of predictors was assessed by using cross-tabulation with Pearson's chi-square test and with simple logistic regression without random effects.

Multivariable models were then created. Initially, all variables which achieved a significance of $P < 0.2$ in the univariable analyses, were offered to these models (n=9 for increased SCC and n=8 for increased TBC). Variables were removed from the initial model by backwards elimination. The *P* value of removal of a variable was assessed by the likelihood ratio test, and for those with a *P* value of > 0.2 the variable with the largest probability was removed. This process was repeated until no variable could be removed with a *p* value of > 0.2. The final multivariable test for increased SCC required the following variables: (a) availability of straw bedding, (b) annual frequency of check-ups of the system by technician, (c) total milk quantity per goat obtained during the preceding milking period, (d) duration of the dry-period. The final multivariable test for increased TBC required the following variables: (a) temperature of cleaning water, (b) use of laboratory diagnostic examinations in samples of milk preventively, (c) use of teat disinfection after milking.

The potential association of the mean body condition score or the standard error of the mean (s.e.m.) score in each herd with the SCC or TBC was assessed by using analysis of correlation.

The potential association of the content (fat, total protein, lactose, added water) of the bulk-tank milk of these herds with the SCC or TBC was assessed by using analysis of correlation. The potential association of annual per animal milk production during the previous lactation period with the SCC of the bulk-tank milk was also assessed by analysis of correlation. Correlations and correlation coefficients are those of Pearson.

In all analyses, statistical significance was defined at $P \leq 0.05$.

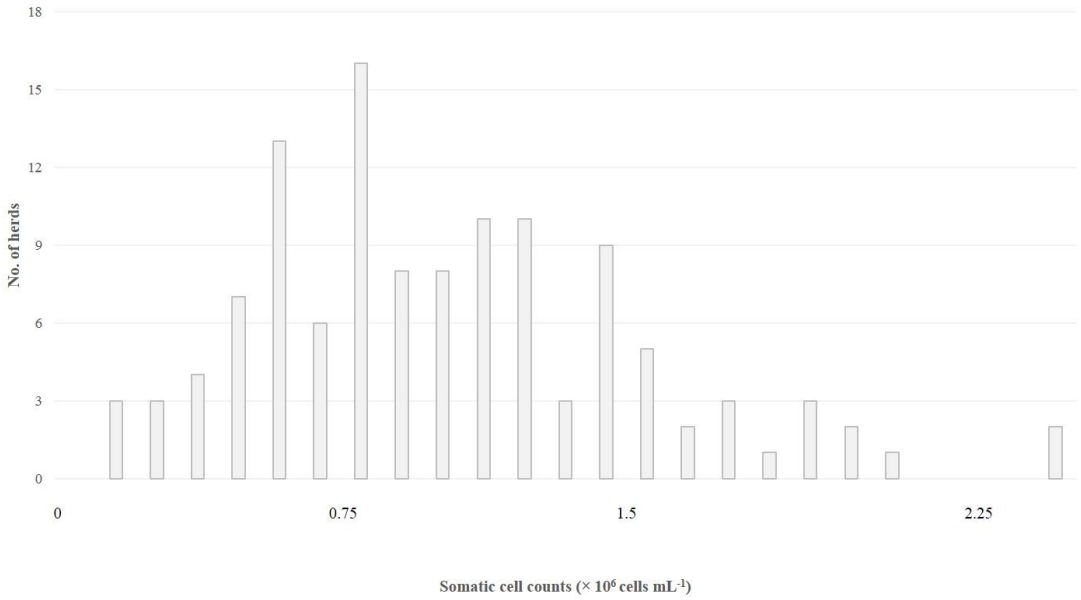
Supplementary material 3. Variables evaluated for potential association with somatic cell counts (n=52) or total bacterial counts (n=57) in the bulk-tank milk of 119 goat herds in Greece.

Management system applied in the farm (description according to EFSA classification)
Month into the lactation period at sampling (month)
Availability of milking parlour (yes / no)
Availability of a waiting area before the milking parlour (yes / no)
Material of the floor of the barn (cement / soil / slatted wood / slatted metal / other)
Availability of straw bedding (yes / no)
Annual frequency of removal / clean-up of the straw bedding (no. of occasions)
Availability of mechanical ventilators (yes / no)
Year of initial establishment or of most recent renovation of the milking parlour (year)
Volume of the parlour (m^3)
Material of the floor of the milking parlour (cement / tile / soil / other)
Type of milking system (mobile / non-mobile)
Type of milking parlour (fishbone / circular / linear parallel / linear one-sided / other)
Number of animal positions in the parlour (no.)
Number of available milking units per animal position (no.)
Provision of feed during milking (yes / no)
Availability of facilities for milk yield measurement (yes / no)
Availability of milk quality indicators (yes / no)
Availability of milk flow indicators (yes / no)
System pulsation rate (p. min^{-1})
System pressure (kPa.)
System pulsation rate to pressure ratio
Type of flow line (low / high)
Frequency of check-ups of the system by farmer (no. of occasions)
Regular check-up of the system by technicians (yes / no)
Annual frequency of check-ups of the system by technicians (no. of occasions)
Type of system check-ups performed by technicians (dynamic / static)
Water cleaning of parlour after the milking sessions (yes / no)
Temperature of cleaning water (^oC)
Use of detergent for parlour cleaning after the milking sessions (yes / no)
Annual frequency of changing teatcups (no. of occasions)
Availability of milk tank (yes / no) [1]
Availability of mixer in the milk tank (yes / no) [1]
Temperature in milk tank (description) [1]
Frequency of milk tank cleaning (description) [1]
Frequency of milk collection (description) [1]
Grazing land by the animals (acres per animal)
No. of goats in the farm (no.)
Breed of goats (description)
Average age of culling goats
Month of the start of the kidding season (description)
Total milk quantity per goat obtained during the preceding milking period (litres)
Total number of kids born per goat (no.)
Collaboration with a veterinarian (yes / no)
Use of laboratory diagnostic examinations in samples of milk preventively (yes / no)
Total visits made annually by veterinarians to the farm during the preceding season (no.)

Clinical mastitis annual incidence risk in the farm (%)
Nutritional modifications performed according to the reproductive stage (yes / no)
Age for kid removal from their dams (days)
Daily number of milking sessions (no.)
Duration of the dry-period (months)
Vaccination against mastitis (yes / no)
Administration of ‘dry-ewe’ treatment at the end of the lactation period (yes / no)
Use of teat disinfection after milking (yes / no)
Farmer's age (years)
Length of animal farming experience (years)
Education of the farmer (description)
Presence of working staff in the farm

[1] parametres evaluated only for potential association with total bacterial counts.

Supplementary material 4. Distribution of 119 goat herds in Greece in accord with somatic cell counts in bulk-tank milk.



Supplementary material 5. Isolation of staphylococci from bulk-tank milk of 119 goat herds in Greece and association with somatic cell counts or total bacterial counts in the milk.

	Herds (n)	Frequency of staphylococcal isolation		
		All isolates	*S. aureus* isolates	Coagulase-negative staphylococci
Somatic cell counts				
All staphylococcal isolates				
< 0.75×10^6 cells mL^{-1}	42	25 (0.595)	2[a] (0.048)	23 (0.548)
> 0.75×10^6 cells mL^{-1}	77	50 (0.649)	19[a] (0.247)	31 (0.403)
Biofilm-forming staphylococcal isolates				
< 0.75×10^6 cells mL^{-1}	42	17 (0.405)	1[b] (0.024)	16 (0.381)
> 0.75×10^6 cells mL^{-1}	77	38 (0.494)	16[b] (0.208)	22 (0.286)
Total bacterial counts				
All staphylococcal isolates				
< 1500×10^3 cfu mL^{-1}	90	55 (0.611)	14 (0.156)	41 (0.456)
> 1500×10^3 cfu mL^{-1}	29	20 (0.690)	7 (0.241)	13 (0.448)
Biofilm-forming staphylococcal isolates				
< 1500×10^3 cfu mL^{-1}	90	39 (0.433)	11 (0.122)	28 (0.311)
> 1500×10^3 cfu mL^{-1}	29	16 (0.552)	6 (0.207)	10 (0.345)

a,b: $P < 0.01$ for differences between proportions with same superscripts.

Supplementary material 6. Variables with significant differences between their categories when assessed for potential association with somatic cell counts (geometric mean [95% CI] cells mL^{-1}) (n=3 variables) with total bacterial counts (geometric mean [95% CI] cells mL^{-1}) (n=2 variables) in the bulk-tank milk of 119 goat herds in Greece.

Somatic cell counts				
Provision of feed during milking				
Yes (n=58)		No (n=8)		*P*
0.913×10^6 (0.794×10^6–1.047×10^6)		0.568×10^6 (0.339×10^6–0.933×10^6)		0.020
Type of flow line				
High (n=43)	Low (n=16)	Other (n=7)		*P*
0.888×10^6 (0.776×10^6–1.023×10^6)	0.990×10^6 (0.692×10^6–1.175×10^6)	0.522×10^6 (0.302×10^6–0.912×10^6)		0.027
Daily number of milking sessions				
One (n=4)	Two (n=108)	Three (n=7)		*P*
0.342×10^6 (0.162×10^6–0.741×10^6)	0.880×10^6 (0.794×10^6–0.955×10^6)	0.659×10^6 (0.525×10^6–0.832×10^6)		0.002
Total bacterial counts				
Type of milking parlour				
Circular (n=4)	Parallel (n=21)	Linear one-sided (n=41)	Other (n=0)	*P*
75×10^3 (5×10^3–1288×10^3)	788×10^3 (427×10^3–1479×10^3)	586×10^3 (372×10^3–933×10^3)	n/a	0.001
No. of goats in the farm				
Up to 165 (n=56)	166 to 330 (n=37)	331 to 500 (n=13)	Over 500 (n=13)	*P*
391×10^3 (257×10^3–589×10^3)	934×10^3 (646×10^3–1349×10^3)	480×10^3 (251×10^3–912×10^3)	1008×10^3 (513×10^3–1950×10^3)	0.011

Supplementary material 7. Variables (n=50) with no significant differences between their categories when assessed for potential association with somatic cell counts (geometric mean [95% CI] cells mL^{-1}) in the bulk-tank milk of 119 goat herds in Greece.

Somatic cell counts				Total bacterial counts			
Management system							
Intensive (n=9)	Semi-intensive (n=29)	Semi-extensive (n=61)	Extensive (n=20)	Intensive (n=9)	Semi-intensive (n=29)	Semi-extensive (n=61)	Extensive (n=20)
0.769×10^6	0.816×10^6	0.844×10^6	0.889×10^6	832×10^3	761×10^3	501×10^3	525×10^3
Month into the lactation period at sampling							
0-1st (n=8)	2nd-5th (n=60)	6th-9th (n=43)	After 9th (n=8)	0-1st (n=8)	2nd-5th (n=60)	6th-9th (n=43)	After 9th (n=8)
0.895×10^6	0.766×10^6	0.949×10^6	0.813×10^6	382×10^3	664×10^3	497×10^3	758×10^3
Availability of milking parlour							
Yes (n=66)		No (n=53)		Yes (n=66)		No (n=53)	
0.862×10^6		0.810×10^6		569×10^3		597×10^3	
Availability of a waiting area before the milking parlour							
Yes (n=60)		No (n=6)		Yes (n=60)		No (n=6)	
0.861×10^6		0.871×10^6		592×10^3		380×10^3	
Material of the floor of the barn							
Soil (n=105)		Other than soil (n=14)		Soil (n=105)		Other than soil (n=14)	
0.844×10^6		0.798×10^6		564×10^3		731×10^3	
Availability of straw bedding							
Yes (n=76)		No (n=43)		Yes (n=76)		No (n=43)	
0.788×10^6		0.936×10^6		640×10^3		490×10^3	
Annual frequency of removal / clean-up of the straw bedding							
1-4 occasions yearly (n=55)		> 4 occasions yearly (n=21)		1-4 occasions yearly (n=55)		> 4 occasions yearly (n=21)	
0.812×10^6		0.725×10^6		577×10^3		841×10^3	

Availability of mechanical ventilators			
Yes (n=8)	No (n=111)	Yes (n=8)	No (n=111)
0.817×10^{6}	0.840×10^{6}	662×10^{3}	576×10^{3}

Years since initial establishment or most recent renovation of the milking parlour					
Up to 10 years (n=50)	11-20 years (n=14)	Over 20 years (n=2)	Up to 10 years (n=50)	11-20 years (n=14)	Over 20 years (n=2)
0.877×10^{6}	0.793×10^{6}	0.987×10^{6}	596×10^{3}	539×10^{3}	610×10^{3}

Volume of the parlour			
Up to 200 m^3 (n=43)	Over 200 m^3 (n=23)	Up to 200 m^3 (n=43)	Over 200 m^3 (n=23)
0.898×10^{6}	0.798×10^{6}	539×10^{3}	428×10^{3}

Material of the floor of the milking parlour							
Concrete (n=35)	Tiles (n=9)	Soil (n=14)	Other (n=8)	Concrete (n=35)	Tiles (n=9)	Soil (n=14)	Other (n=8)
0.886×10^{6}	0.869×10^{6}	0.748×10^{6}	0.972×10^{6}	610×10^{3}	428×10^{3}	491×10^{3}	743×10^{3}

Type of milking system			
Built-in system (n=59)	Mobile system (n=7)	Built-in system (n=59)	Mobile system (n=7)
0.888×10^{6}	0.671×10^{6}	611×10^{3}	310×10^{3}

Type of milking parlour							
Circular (n=4)	Parallel (n=21)	One-sided (n=41)	Other (n=0)	Circular (n=4)	Parallel (n=21)	One-sided (n=41)	Other (n=0)
849×10^{6}	920×10^{6}	834×10^{6}	n/a	Supplementary material 6			

Number of animal positions in the parlour					
Less than 24 (n=23)	24 (n=26)	Over 24 (n=17)	Less than 24 (n=23)	24 (n=26)	Over 24 (n=17)
0.746×10^{6}	0.488×10^{6}	0.784×10^{6}	532×10^{3}	488×10^{3}	784×10^{3}

Number of available milking units per animal position			
< 1 (n=42)	1 (n=24)	< 1 (n=42)	1 (n=24)
0.857×10^{6}	0.870×10^{3}	457×10^{3}	833×10^{3}

Provision of feed during milking			
Yes (n=58)	No (n=8)	Yes (n=58)	No (n=8)
Supplementary material 6		603×10^{3}	371×10^{3}

Availability of facilities for milk yield measurement					
Yes (n=3)		No (n=63)	Yes (n=3)		No (n=63)
0.774×10^{6}		0.866×10^{6}	1016×10^{3}		553×10^{3}
Availability of milk quality indicators					
Yes (n=0)		No (n=66)	Yes (n=0)		No (n=66)
n/a		0.838×10^{6}	n/a		581×10^{3}
Availability of milk flow indicators					
Yes (n=1)		No (n=65)	Yes (n=1)		No (n=65)
1.369×10^{6}		0.856×10^{6}	3571×10^{3}		553×10^{3}
System pulsation rate					
< 140 p. min^{-1} (n=19)	140-150 p. min^{-1} (n=37)	> 150 p. min^{-1} (n=10)	< 140 p. min^{-1} (n=19)	140-150 p. min^{-1} (n=37)	> 150 p. min^{-1} (n=10)
0.937×10^{6}	0.809×10^{6}	0.931×10^{6}	511×10^{3}	605×10^{3}	555×10^{3}
System pressure					
< 38 kPa (n=5)	38-42 kPa (n=55)	> 42 kPa (n=6)	< 38 kPa (n=5)	38-42 kPa (n=55)	> 42 kPa (n=6)
0.927×10^{6}	0.848×10^{6}	0.938×10^{6}	560×10^{3}	566×10^{3}	602×10^{3}
System pulsation rate to pressure ratio					
< 3.10 (n=15)	3.10-3.79 (n=29)	≥ 3.80 (n=22)	< 3.10 (n=15)	3.10-3.79 (n=29)	≥ 3.80 (n=22)
1.023×10^{6}	0.828×10^{6}	0.808×10^{6}	643×10^{3}	612×10^{3}	475×10^{3}
Type of flow line					
High (n=43)	Low (n=16)	Other (n=7)	High (n=43)	Low (n=16)	Other (n=7)
	Supplementary material 6		463×10^{3}	1152×10^{3}	401×10^{3}
Frequency of check-ups of the system by farmer					
Daily (n=54)		Less frequently than daily (n=12)	Daily (n=54)		Less frequently than daily (n=12)
0.881×10^{6}		0.779×10^{6}	659×10^{3}		290×10^{3}
Regular check-up of the system by technicians					
Yes (n=50)		No (n=16)	Yes (n=50)		No (n=16)
0.846×10^{6}		0.912×10^{6}	641×10^{3}		553×10^{3}

Annual frequency of check-ups of the system by technicians					
1 check-up (n=24)	2 check-ups (n=15)	> 2 check-ups (n=11)	1 check-up (n=24)	2 check-ups (n=15)	> 2 check-ups (n=11)
0.728×10^{6}	1.054×10^{6}	0.872×10^{6}	529×10^{3}	411×10^{3}	868×10^{3}
Type of system check-ups performed by technicians					
Full (n=50)	Partial (n=0)		Full (n=50)	Partial (n=0)	
0.846×10^{6}	n/a		547×10^{3}	n/a	
Water cleaning of parlour after the milking sessions					
Yes (n=65)	No (n=1)		Yes (n=65)	No (n=1)	
0.863×10^{6}	0.785×10^{6}		564×10^{3}	959×10^{3}	
Temperature of cleaning water					
≤ 65 °C (n=26)	> 65 °C (n=40)		≤ 65 °C (n=26)	> 65 °C (n=40)	
0.922×10^{6}	0.825×10^{6}		456×10^{3}	657×10^{3}	
Use of detergent for parlour cleaning after the milking sessions					
Yes (n=65)	No (n=1)		Yes (n=65)	No (n=1)	
0.869×10^{6}	0.485×10^{6}		587×10^{3}	695×10^{3}	
Annual frequency of changing teatcups					
1 occasion (n=29)	Less frequently than 1 occasion (n=37)		1 occasion (n=29)	Less frequently than 1 occasion (n=37)	
0.944×10^{6}	0.802×10^{6}		505×10^{3}	624×10^{3}	
Availability of milk tank					
Not evaluated			Yes (n=103)	No (n=16)	
			586×10^{3}	553×10^{3}	
Availability of mixer in the milk tank					
Not evaluated			Yes (n=103)	No (n=16)	
			586×10^{3}	553×10^{3}	
Temperature in milk tank					
Not evaluated			≤ 3.5 °C (n=54)	> 3.5 °C (n=49)	
			562×10^{3}	613×10^{3}	

Frequency of milk tank cleaning						
Not evaluated			Daily (n=44)	Every two days (n=56)	Every three days (n=3)	
			483×10^3	659×10^3	1092×10^3	
Frequency of milk collection						
Not evaluated			Daily (n=37)	Every two days (n=79)	Every three days (n=6)	
			615×10^3	543×10^3	1035×10^3	
Grazing land by the animals						
≤ 0.50 ac. per animal (n=17)	0.51-2.00 ac. per animal (n=31)	> 2.00 ac. per animal (n=71)	≤ 0.50 ac. per animal (n=17)	0.51-2.00 ac. per animal (n=31)	> 2.00 ac. per animal (n=71)	
0.781×10^6	0.877×10^6	0.836×10^6	757×10^3	721×10^3	497×10^3	
No. of goats in the farm						
≤ 165 goats (n=56)	166-330 goats (n=37)	331-500 goats (n=13)	> 500 goats (n=13)	≤ 165 goats (n=56)	166-330 goats (n=37)	331-500 goats (n=13)	> 500 goats (n=13)
0.763×10^6	0.916×10^6	0.827×10^6	0.996×10^6	Supplementary material 6			
Breed of goats						
Greek breeds (n=56)	Imported breeds (n=45)	Cross-breeds (n=18)	Greek breeds (n=56)	Imported breeds (n=45)	Cross-breeds (n=18)	
0.927×10^6	0.754×10^6	0.799×10^6	620×10^3	694×10^3	305×10^3	
Average age of culling goats						
≤ 6 years (n=45)		> 6 years (n=74)	≤ 6 years (n=45)		> 6 years (n=74)	
0.917×10^6		0.794×10^6	674×10^3		553×10^3	
Month of the start of the kidding season						
All year (n=8)	Autumn (n=62)	Winter (n=44)	Spring-Summer (n=5)	All year (n=8)	Autumn (n=62)	Winter (n=44)	Spring-Summer (n=5)
0.517×10^6	0.887×10^6	0.835×10^6	0.947×10^6	615×10^3	541×10^3	628×10^3	651×10^3
Total milk quantity per goat obtained during the preceding milking period						
≤ 200 L (n=73)	201-400 L (n=32)	> 400 L (n=14)	≤ 200 L (n=73)	201-400 L (n=34)	> 400 L (n=12)	
0.793×10^6	0.998×10^6	0.719×10^6	599×10^3	664×10^3	365×10^3	
Total number of kids born per goat						
≤ 1.50 (n=102)		> 1.50 (n=17)	≤ 1.50 (n=102)		> 1.50 (n=17)	
0.839×10^6		0.836×10^6	552×10^3		787×10^3	

Collaboration with a veterinarian					
Yes (n=101)		No (n=18)	Yes (n=101)		No (n=18)
0.838×10^{6}		0.842×10^{6}	573×10^{3}		628×10^{3}
Use of laboratory diagnostic examinations in samples of milk preventively					
Yes (n=25)		No (n=94)	Yes (n=25)		No (n=94)
0.939×10^{6}		0.814×10^{6}	848×10^{3}		526×10^{3}
Total visits made annually by veterinarians to the farm during the preceding season					
≤ 4 (n=51)	5-7 (n=25)	> 7 (n=43)	≤ 4 (n=51)	5-7 (n=25)	> 7 (n=43)
0.919×10^{6}	0.787×10^{6}	0.780×10^{6}	602×10^{3}	760×10^{3}	476×10^{3}
Clinical mastitis incidence risk					
≤ 0.50% (n=48)		> 0.50% (n=71)	≤ 0.50% (n=48)		> 0.50% (n=71)
0.750×10^{6}		0.905×10^{6}	617×10^{3}		558×10^{3}
Nutritional modifications performed according to the reproductive stage					
Yes (n=68)		No (n=51)	Yes (n=68)		> 2 months (n=51)
0.909×10^{6}		0.753×10^{6}	573×10^{3}		592×10^{3}
Age for kid removal from their dams					
< 45 (n=34)	45-60 (n=36)	> 60 (n=49)	< 45 (n=34)	45-60 (n=36)	> 60 (n=49)
0.709×10^{6}	0.888×10^{6}	0.903×10^{6}	484×10^{3}	629×10^{3}	623×10^{3}
Daily number of milking sessions					
One (n=4)	Two (n=108)	Three (n=7)	One (n=4)	Two (n=108)	Three (n=7)
Supplementary material 6			421×10^{3}	600×10^{3}	428×10^{3}
Duration of the dry-period					
≤ 2 months (n=40)		> 2 months (n=79)	≤ 2 months (n=40)		> 2 months (n=79)
0.765×10^{6}		0.879×10^{6}	468×10^{3}		646×10^{3}
Vaccination against mastitis					
Yes (n=35)		No (n=84)	Yes (n=35)		No (n=84)
0.919×10^{6}		0.807×10^{6}	732×10^{3}		528×10^{3}

Administration of 'dry-ewe' treatment at the end of the lactation period					
Yes (n=15)		No (n=104)	Yes (n=15)		No (n=104)
0.901×10^6		0.830×10^6	651×10^3		572×10^3
Use of teat disinfection after milking					
Yes (n=12)		No (n=107)	Yes (n=12)		No (n=107)
0.851×10^6		0.837×10^6	734×10^3		566×10^3
Farmer's age					
Up to 50 years (n=73)		Over 50 years (n=46)	Up to 50 years (n=73)		Over 50 years (n=46)
0.836×10^6		0.842×10^6	709×10^3		424×10^3
Length of animal farming experience					
≤5 years (n=24)	6-29 years (n=39)	> 30 years (n=56)	≤ 5 years (n=24)	6-29 years (n=39)	> 30 years (n=56)
0.838×10^6	0.876×10^6	0.814×10^6	610×10^3	583×10^3	568×10^3
Education of the farmer					
Up to secondary (n=89)		Over secondary (n=30)	Up to secondary (n=89)		Over secondary (n=30)
0.870×10^6		0.751×10^6	643×10^3		431×10^3
Presence of working staff in the farm					
Yes (n=34)		No (n=85)	Yes (n=34)		No (n=85)
0.855×10^6		0.832×10^6	640×10^3		559×10^3

Supplementary material 8. Variables associated with increased somatic cell counts (> 0.75×10^6 cells mL^{-1}) (n=2 variables) or with increased total bacterial counts (> 1500×10^3 cfu mL^{-1}) (n=1 variable) in the bulk-tank milk of 119 goat herds in Greece, as found in univariable analysis.

Somatic cell counts			
Variable	**Proportion of flocks with increased SCC [1]**	**Odds ratio [2] (95% confidence intervals**	***P***
Annual frequency of check-ups of the system by technicians			0.028
1 check-up (n=24)	0.458	reference	
2 check-ups (n=25)	0.867	7.682 (1.415-41.693)	0.018
>2 check-ups (n=11)	0.727	3.152 (0.668-14.863)	0.147
Daily number of milking sessions			0.024
One (n=4)	0.250	reference	
Two (n=108)	0.685	6.529 (0.655-65.084)	0.110
Three (n=7)	0.286	1.200 (0.073-19.634)	0.898
Total bacterial counts			
Variable	**Proportion of flocks with increased TBC [3]**	**Odds ratio [2] (95% confidence intervals**	***P***
Type of flow line			0.007
High line (n=43)	0.163	3.082 (0.158-59.997)	0.457
Low line (n=16)	0.500	15.000 (0.735-306.300)	0.079
Other type (n=7)	0.000	reference	

1 SCC: somatic cell counts, 2 odds ratios calculated against the lowest frequency of increased SCC or TBC, 3 TBC: total bacterial counts.

Supplementary material 9. Variables with $P < 0.20$ in the difference of their categories for increased somatic cell counts (i.e., > 0.75×10^6 cells mL^{-1}) (n=9 variables) or for increased total bacterial counts (i.e., > 1500×10^3 cfu mL^{-1}) (n=8 variables) in the bulk-tank milk of 119 goat herds in Greece, as found in the univariable analysis, which were then included in the multivariable analysis.

Somatic cell counts
Variables
Availability of straw bedding
Provision of feed during milking
Annual frequency of check-ups of the system by technicians
Use of detergent for parlour cleaning after the milking sessions
Month of the start of the kidding season
Total milk quantity per goat obtained during the preceding milking period
Total visits made annually by veterinarians to the farm during the preceding season
Daily number of milking sessions
Duration of the dry-period
Total bacterial counts
Variables
Material of the floor of the milking parlour
Type of milking parlour
Availability of milk flow indicators
Type of flow line
Temperature of cleaning water
No. of goats in the farm
Use of laboratory diagnostic examinations in samples of milk preventively
Use of teat disinfection after milking

Supplementary material 10. Variables (n=3) which were included in the final multivariable test for evaluation for increased somatic cell counts (i.e., > 0.75×10^6 cells mL^{-1}) in the bulk-tank milk of 119 goat herds in Greece.

Variables	*P*
Temperature of cleaning water	0.096
Use of laboratory diagnostic examinations in samples of milk preventively	0.20
Use of teat disinfection after milking	0.19