

Economic performance of dairy sheep farms in less-favored areas of Greece: A comparative analysis based on flock size and farming system

Table S1. Descriptive statistics (mean and standard deviation) of collected technical farm data for each studied period.

Trait	Period	N	Mean	SD ¹
Ewes milked	2019-2020	19	173.8	60.98
	2020-2021	26	189.3	82.8
Ewes non milked	2019-2020	19	25.8	22.84
	2020-2021	26	27.0	25.25
Rams	2019-2020	19	9.5	4.89
	2020-2021	26	9.4	4.38
Lambs	2019-2020	19	48.0	32.98
	2020-2021	26	54.4	33.64
Lambs slaughtered	2019-2020	19	197.8	112.96
	2020-2021	26	174.2	116.89
Adult sheep slaughtered	2019-2020	19	41.4	46.35
	2020-2021	26	30.9	23.69
Lambs sold	2019-2020	19	0.9	3.90
	2020-2021	26	1.6	7.84
Milk production (kg/ewe/milking period)	2019-2020	19	218.5	88.71
	2020-2021	26	238.6	91.76
Milking period (months)	2019-2020	19	8.9	9.51
	2020-2021	26	8.7	1.00
Fat content (%)	2019-2020	19	6.4	0.66
	2020-2021	26	6.4	0.90
Protein content (%)	2019-2020	19	5.6	0.21
	2020-2021	26	5.3	0.66
Milk price (€/kg)	2019-2020	19	0.8	0.02
	2020-2021	26	0.9	0.08
Lamb carcass weight (kg)	2019-2020	19	9.5	1.12
	2020-2021	26	9.5	1.39
Lamb carcass price (€/kg)	2019-2020	19	4.5	0.45
	2020-2021	26	4.9	0.76
Adult carcass price (€/kg)	2019-2020	19	1.6	0.34
	2020-2021	26	2.1	0.38
Weight at weaning (kg)	2019-2020	19	15.6	1.74
	2020-2021	26	16.0	2.50
Age at weaning (months)	2019-2020	19	1.9	0.96
	2020-2021	26	1.7	0.47
Grazing area (hectares)	2019-2020	19	13.5	8.18
	2020-2021	26	45.1	43.00
Grazing time (hours)	2019-2020	19	5.8	1.97
	2020-2021	26	6.4	2.50
Grazing distance (km)	2019-2020	19	3.2	2.04
	2020-2021	26	3.1	2.42
Concentrate for lambs (kg/day)	2019-2020	19	0.6	0.11

	2020-2021	26	0.7	0.26
Concentrate for milked ewes (kg/day)	2019-2020	19	1.0	0.21
	2020-2021	26	1.0	0.22
Concentrate for dry period (kg/day)	2019-2020	19	0.5	0.23
	2020-2021	26	0.5	0.19
Concentrate for last month before birth (kg/day)	2019-2020	19	0.8	0.16
	2020-2021	26	0.7	0.20
Concentrate for non-milked ewes (kg/day)	2019-2020	19	0.5	0.23
	2020-2021	26	0.5	0.21
Concentrate for rams (kg/day)	2019-2020	19	0.6	0.25
	2020-2021	26	0.8	0.43
Hay for lambs (kg/day)	2019-2020	19	0.7	0.22
	2020-2021	26	0.7	0.62
Hay for milked ewes (kg/day)	2019-2020	19	1.5	0.55
	2020-2021	26	1.3	0.41
Hay for dry period (kg/day)	2019-2020	19	0.8	0.35
	2020-2021	26	0.8	0.6
Hay for non-milked ewes (kg/day)	2019-2020	19	1.1	0.35
	2020-2021	26	0.7	0.63
Hay for rams (kg/day)	2019-2020	19	0.8	0.30
	2020-2021	26	0.7	0.58

¹SD = standard deviation.

Table S2. Descriptive statistics (mean and standard deviation) of collected economic farm data for each studied period.

Trait	Period	N	Mean	SD¹
Subsidy income (€/year)	2019-2020	19	9,568.4	8,064.33
	2020-2021	26	11,896.2	10616.9
Cost of labour (€/hour)	2019-2020	19	1.8	1.34
	2020-2021	26	3.5	0.75
Cost of seasonal labour (€/year)	2019-2020	19	89.7	390.01
	2020-2021	26	353.9	1,295.29
Hectares of area rented (€/year)	2019-2020	19	8.5	10.84
	2020-2021	26	17.1	23.31
Transportation costs (€/year)	2019-2020	19	2,984.2	4,271.65
	2020-2021	26	4,173.1	3,528.24
Utility costs (€/year)	2019-2020	19	962.11	982.23
	2020-2021	26	1,731.4	2,009.78
Milking parlour costs (€/year)	2019-2020	19	497.4	610.66
	2020-2021	26	979.6	1,020.69
Veterinary costs (€/animal)	2019-2020	19	4.5	2.62
	2020-2021	26	5.6	2.50
Grazing land costs (€/year)	2019-2020	19	550.0	729.38
	2020-2021	26	454.1	648.73
Milk price (€/kg)	2019-2020	19	0.8	0.02
	2020-2021	26	0.9	0.08

Lamb carcass price (€/kg)	2019-2020	19	4.5	0.45
	2020-2021	26	4.9	0.76
Adult carcass price (€/kg)	2019-2020	19	1.6	0.34
	2020-2021	26	2.1	0.38
Concentrate for lambs price (€/kg)	2019-2020	19	0.3	0.06
	2020-2021	26	0.3	0.05
Concentrate for lactation period price (€/kg)	2019-2020	19	0.4	0.05
	2020-2021	26	0.4	0.05
Concentrate for dry period price (€/kg)	2019-2020	19	0.3	0.07
	2020-2021	26	0.3	0.05
Concentrate for last month before birth price (€/kg)	2019-2020	19	0.3	0.06
	2020-2021	26	0.3	0.06
Concentrate for rams price (€/kg)	2019-2020	19	0.3	0.06
	2020-2021	26	0.3	0.07
Hay price (€/kg)	2019-2020	19	0.1	0.03
	2020-2021	26	0.3	0.28
Straw price (€/kg)	2019-2020	19	0.1	0.01
	2020-2021	26	0.1	0.00

¹SD = standard deviation.

Table S3. Effects (mean and standard deviation, β -coefficient, standard error) of flock size on farm economic performance traits for each studied period.

	Period	Smaller farms ³	Larger farms ⁴	β -coefficient	P-Value
Gross margin (€)	1 ¹	-1,187.1 (4,997.31)	12,801.7 (4,261.72)	-13,988.8 (6,567.76)	0.0481
	2 ²	6571.0 (7,880.00)	20,593.0 (5734.00)	-14,022.0 (9,746.00)	0.1631
Gross margin per ewe (€)	1	-10.6 (19.39)	49.6 (16.54)	-60.2 (25.49)	0.0304
	2	52.6 (31.10)	74.4 (22.60)	-21.8 (38.40)	0.5700
Income (€)	1	28,980.7 (9,013.86)	70,963.1 (7,687.05)	-41,982.4 (11,846.54)	0.0025
	2	35,544.0 (11,687.0)	82,571.0 (8,503.0)	-47,027.0 (14,453.0)	0.0034
Income from milk (%)	1	54.9 (3.45)	60.8 (2.94)	-5.9 (4.54)	0.2110
	2	62.2 (3.97)	66.2 (2.89)	-4.0 (4.91)	0.4215
Income from meat (%)	1	22.0 (3.76)	22.8 (3.21)	-0.8 (4.94)	0.8778
	2	17.8 (2.59)	16.7 (1.88)	1.1 (3.20)	0.7324
Income from subsidy (%)	1	23.1 (3.68)	16.3 (3.14)	6.8 (4.83)	0.1751

	2	19.4 (4.48)	17.1 (3.26)	2.3 (5.53)	0.6805
Variable costs (€)	1	30,167.8 (6,367.4)	58,161.4 (5,430.14)	-27,993.6 (8,368.41)	0.0038
	2	28,972.1 (7,326.10)	61,977.1 (5,331.10)	-33,005.0 (9,060.0)	0.0013
Variable costs per milked ewe (€)	1	204.6 (22.97)	221.9 (19.60)	-17.3 (30.19)	0.5745
	2	224.0 (34.9)	205.0 (25.40)	19.4 (43.20)	0.6579
Variable costs per not milked ewe (€)	1	105.1 (21.02)	105.9 (17.93)	-0.8 (27.6)	0.9779
	2	163.0 (34.10)	140.0 (24.10)	22.8 (41.8)	0.5912
Variable costs per ram (€)	1	108.9 (14.59)	146.5 (12.40)	-37.6 (19.18)	0.0668
	2	190.0 (39.50)	169.0 (28.70)	21.0 (48.80)	0.6712
Variable costs per lamb (€)	1	82.2 (9.87)	84.2 (8.42)	-2.0 (12.97)	0.8776
	2	144.0 (34.90)	111.0 (21.20)	32.7 (37.50)	0.3918
Feed costs per milked ewe (€)	1	174.1 (18.70)	189.9 (15.95)	-15.9 (24.58)	0.5266
	2	147.0 (14.30)	159.0 (15.40)	-12.0 (17.70)	0.5047
Feed costs per not milked ewe (€)	1	74.6 (15.25)	76.6 (13.01)	-2.0 (20.05)	0.9202
	2	84.0 (14.60)	93.0 (10.30)	-9.0 (17.90)	0.6202
Feed costs per ram (€)	1	78.5 (13.77)	114.6 (11.75)	-36.2 (18.10)	0.0620
	2	113.0 (19.90)	123 (14.50)	-10.3 (24.7)	0.6794
Feed costs per lamb (€)	1	51.5 (3.29)	52.4 (2.80)	-0.9 (4.32)	0.8402
	2	58.7 (7.49)	65.2 (5.14)	-6.5 (9.08)	0.4809
Feeding costs (%)	1	83.4 (3.24)	83.8 (2.76)	-0.4 (4.26)	0.9211
	2	72.9 (4.61)	75.6 (3.35)	-2.7 (5.70)	0.6415
Labour costs (%)	1	0.1 (0.95)	1.5 (0.81)	-1.5 (1.25)	0.2417
	2	0.6 (1.91)	3.3 (1.4)	-2.7 (2.36)	0.2612
Renting costs (%)	1	1.8 (1.08)	3.9 (0.92)	-2.1 (1.42)	0.1529
	2	5.4 (2.54)	4.4 (1.85)	3.1 (0.99)	0.7539
Transportation costs (%)	1	6.1 (2.16)	5.3 (1.84)	0.9 (2.84)	0.7569
	2	7.9 (1.96)	8.4 (1.42)	-0.5 (2.42)	0.8511
Utility costs (%)	1	3.8	1.2	2.6	0.0157

		(0.71)	(0.63)	(0.97)	
	2	5.0	2.6	2.4	0.0518
		(0.96)	(0.70)	(1.19)	
Milking parlour costs (%)	1	1.7	0.6	1.1	0.0722
		(0.43)	(0.37)	(0.57)	
	2	2.7	1.5	1.2	0.1507
		(0.65)	(0.48)	(0.81)	
Veterinary costs (%)	1	2.2	2.8	-0.6	0.4174
		(0.51)	(0.43)	(0.67)	
	2	3.1	3.4	-0.32	0.6187
		(0.51)	(0.37)	(0.63)	
Grazing land costs (%)	1	1.0	1.0	0.03	0.9605
		(0.50)	(0.43)	(0.66)	
	2	1.9	0.4	1.5	0.0387
		(0.53)	(0.39)	(0.65)	

¹1= 2019-2020, ²2= 2020-2021, ³Smaller farms= ≤150 ewes, ⁴Larger farms= > 150 ewes.

Table S4. Effects (mean and standard deviation, β -coefficient, standard error) of farming system on farm economic performance traits for each studied period.

	Period	Intensive/semi-intensive farms	Semi-extensive farms	β -coefficient	P-Value
Gross margin (€)	1 ¹	14,459.3 (5,084.21)	1,422.4 (4,335.83)	13,036.9 (6,681.97)	0.0677
	2 ²	27,871.0 (7,621.00)	9,317.0 (5,545.00)	18,553. (9,425.00)	0.0607
Gross margin per ewe (€)	1	47.6 (21.07)	7.3 (17.97)	40.3 (27.7)	0.1640
	2	111.3 (29.2)	43.3 (21.2)	68.0 (36.10)	0.0720
Income (€)	1	77,960.2 (8,911.60)	35,341.6 (7,599.85)	42,618.6 (11,712.15)	0.0020
	2	96,596.0 (12,617.10)	53,425.0 (9,180.10)	37,171.0 (15,603.0)	0.025
Income from milk (%)	1	62.5 (3.36)	52.2 (2.87)	7.2 (4.42)	0.1202
	2	66.0 (4.02)	64.3 (2.92)	1.7 (4.97)	0.7367
Income from meat (%)	1	18.7 (3.56)	25.3 (3.04)	-6.5 (4.68)	0.1781
	2	13.5 (2.43)	18.9 (1.77)	-5.4 (3.01)	0.0836
Income from subsidy (%)	1	18.6 (3.88)	19.5 (3.31)	-0.9 (5.11)	0.8637
	2	20.5 (4.44)	16.5 (3.23)	4.1 (5.49)	0.04653
Variable costs (€)	1	63,500.8 (6,118.0)	39,919.2 (5,217.45)	29,581.7 (8,040.62)	0.0020
	2	62,275.0 (8,597.00)	44,108.0 (6,255.00)	18,618.0 (10,632.00)	0.0927
Variable costs per milked ewe (€)	1	260.6 (17.98)	181.2 (15.33)	79.4 (23.63)	0.037
	2	273.0	180.0	93.0	0.025

		(31.50)	(22.90)	(39.0)	
Variable costs per not milked ewe (€)	1	132.8	85.8	47.0	0.0796
		(19.16)	(16.34)	(25.08)	
	2	207.0	123.0	83.8	0.0470
		(33.50)	(21.50)	(39.80)	
Variable costs per ram (€)	1	139.0	124.6	14.4	0.5019
		(15.94)	(13.59)	(20.94)	
	2	241.0	143.0	98.4	0.004
		(36.20)	(26.30)	(44.70)	
Variable costs per lamb (€)	1	100.1	71.2	28.8	0.017
		(8.32)	(7.10)	(10.94)	
	2	175.5	96.5	79.0	0.031
		(28.30)	(19.40)	(34.30)	
Feed costs per milked ewe (€)	1	211	163.1	47.9	0.044
		(16.74)	(14.28)	(22.0)	
	2	175.0	144.0	30.8	0.0770
		(13.52)	(9.84)	(10.70)	
Feed costs per not milked ewe (€)	1	83.1	70.4	12.8	0.5280
		(15.07)	(12.86)	(19.81)	
	2	95.8	87.6	8.2	0.6620
		(15.60)	(10.00)	(18.60)	
Feed costs per ram (€)	1	89.5	106.6	-17.1	0.3986
		(14.98)	(12.77)	(19.68)	
	2	143.0	107.0	36.1	0.1400
		(19.10)	(13.90)	(23.60)	
Feed costs per lamb (€)	1	50.3	53.3	-3.0	0.4866
		(3.24)	(2.76)	(4.26)	
	2	67.5	61.1	6.3	0.4938
		(7.49)	(5.14)	(9.08)	
Feeding costs (%)	1	77.5	88.1	-10.6	0.006
		(2.59)	(2.21)	(3.40)	
	2	67.0	78.7	-11.7	0.034
		(4.21)	(3.06)	(5.21)	
Transportation costs (%)	1	7.8	4.1	3.7	0.1884
		(2.05)	(1.75)	(2.70)	
	2	11.3	6.6	4.7	0.039
		(1.79)	(1.3)	(2.22)	
Utility costs (%)	1	3.0	1.7	1.3	0.2557
		(0.85)	(0.72)	(1.11)	
	2	3.8	3.2	0.6	0.6353
		(1.04)	(0.76)	(1.28)	
Milking parlour costs (%)	1	1.9	0.5	1.4	0.015
		(0.40)	(0.34)	(0.53)	
	2	3.2	1.2	2.0	0.010
		(0.59)	(0.43)	(0.73)	
Veterinary costs (%)	1	3.3	2.0	1.3	0.0556
		(0.47)	(0.40)	(0.61)	
	2	3.9	3.0	0.9	0.1547
		(0.49)	(0.36)	(0.61)	
Grazing land costs (%)	1	1.1	0.9	0.3	0.6596
		(0.50)	(0.42)	(0.65)	
	2	0.16	1.4	-1.2	0.0865
		(0.54)	(0.40)	(0.67)	

¹1= 2019-2020, ²2= 2020-2021.