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REPRODUCTIVE PARAMETERS IN BEIRA BAIXA MERINO EWES

J.P. VÁRZEA RODRIGUES
J.P. FRAGOSO DE ALMEIDA
C. REBELO DE ANDRADE
L. MATOS ALMEIDA
F. HENRIQUES ROSA

ESCOLA SUPERIOR AGRÁRIA
INSTITUTO POLITÉCNICO DE CASTELO BRANCO
Portugal

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ABSTRACT

A collection and sellection of data has been carried on the Merino Beira Baixa ewes at Escola Superior Agraria (Agricultural School) in Castelo Branco (ESACB) in Portugal from 1981 to 1989.

According to the birth type of females (single or double) their average age at the time of first lambing amounted to 599.85±150.47 days and to 574.13±147.06 days. Differences were not significant. However this parameter was influenced by the "year" factor ($P<0.01$).

It was shown that lambing interval (IP) did not depended on parturition months inside the seasons, but depended on parturition months between the parturition season (from january to april 322.66±79.31 days and from august to december 380.67±73.81 days). The IP revealed significant differences ($P<0.01$) in terms of ewes age at lambing.

The apparent fertility rate, prolificacy rate and numerical productivity are, in 1981-87 and 1987-88, 86.6% vs 85.9%, 114.2% vs 112.3%, 92.7% vs 84.9% respectively. All these rates were influenced by the ewes age at lambing.

Reproductive parameters in period with altered reproductive management (two autonoms herds without ewes transference) are differents, favourable to Autumn mating season.

Analysis was carried on further reproductive parameters.

INTRODUCTION

Sheep production in Portugal has acquired a proeminent place in the economy of farming systems. Therefore we think it is important to assess and study the potentiality of our autochthon breeds. In this sense we have developed works in goal to characterize the Beira Baixa Merino breed.

Though origins of the name have not been clearly stated yet, several hypothesis have been forwarded (Pinto de Andrade et al., 1987). The number of animals at the present amounts to some 165 000 reproductive ewes (Sobral, 1986), wich represents more or less 8% of the total number of sheep in the Country.

The aim of this article is not reach final conclusions in what concers the potenciality of the breed, it is a contribution to the characterization of the Beira Baixa Merino by determining reproductive parameters.

The Autumn season is kept for the general improvement of animals which have reached reproductive age and weight for the first time and of animals wich weren´t in the previous season. Spring mating season was been the main reproductive season.

We observed best reproductiva parameters in Spring mating season (Rebello de Andrade et al.,1987). Since Autumn 1987 reproductive management was been altered, the flock was been divided in two independent herds, without ewes transferences. The results was been differents, favourable to Autumn mating season, and confirmed preliminary results (Várzea Rodrigues et al., 1989).

1. MATERIALS AND METHODS

The data presented in this article were collected from the total number of ewes at Escola Superior Agraria (Castelo Branco, Portugal) from 1981 to 1989.

The animals are raised in pastures the whole year trough, using 40 ha area of barren land with an average of 7 ewes/ha. During the winter season, there is an additinal diet based on oats and vetch hays. During lactation the ewes get a supplemental diet of commercial concentrate (200-300 g / head / day).

The reproductive parameters have been estimated according to the methodology proposed by DESVIGNES (1968). In all data examination all inconsistent information was not considered.

The technique used for the determination of the variance components was always the analysis of variance of data classified in groups with numbers not equal to objects (Snedecor and Cochoran, 1980).

TABLE 1. Average age (± SD)at first conception of ewes born in spring and autumn

	JAN	FEB	MAR	SPRING	AUG	SEP	OCT	NOV	AUTUMN	TOTAL
Nº OF EWES	21	34	4	59	41	128	50	9	228	287
AVERAGE	376.67	438.65	427.75	415.39	407.37	461.45	414.56	451.56	441.05	434.04
SD	115.08	125.39	17.69	119.95	166.91	154.99	117.75	119.12	149.80	145.48

BLE 2. Average age (± SD) at lambing according to birth year and birth type (Single and Double)

ARS		1st lambing		2nd lambing		3rd lambing		4th lambing		5th lambing		6th lambing		7th lambing	
		S	D	S	D	S	D	S	D	S	D	S	D	S	D
	Nº	22	16	18	14	18	12	17	11	15	10	8	9	2	4
	A	655.41	593.56	1015.17	890.93	1375.44	1289.33	1749.24	1702.00	2208.60	2064.10	2527.38	2391.44	2775.50	2619.50
	SD	132.30	150.20	178.03	196.74	166.51	186.14	190.56	235.45	247.91	183.81	146.49	173.71	125.16	71.51
	Nº	71	11	64	10	59	10	53	7	39	6	18	1		
	A	628.20	650.00	1004.59	1029.10	1352.34	1430.70	1750.43	1890.00	2091.85	2159.17	2281.78	2365.00		
	SD	167.34	165.30	191.99	196.42	194.09	226.84	200.40	217.74	189.01	246.89	74.89	-		
	N	27	13	27	9	24	9	17	9	11	7				
	A	550.67	588.62	895.11	915.11	1266.13	1307.00	1605.12	1614.78	1874.64	1851.43				
	SD	148.33	186.21	196.01	191.19	226.30	226.67	184.88	246.07	121.08	123.32				
	Nº	27	2	19	2	16	2	11	2						
	A	674.44	607.00	966.26	845.50	1336.31	1095.50	1551.00	1447.00						
	SD	176.08	148.49	209.29	3.54	214.89	48.79	98.35	4.24						
	Nº	33	8	31	8	22	7								
	A	522.64	457.63	874.58	823.75	118.27	1135.43								
	SD	69.76	54.95	96.60	165.03	53.00	109.66								
)	Nº	11	12	10	2										
	A	537.45	508.00	853.30	882.00										
	SD	119.02	12.73	50.17	-										
)	Nº	29	16	4	3										
	A	576.14	552.50	733.00	752.33										
	SD	113.23	108.69	18.96	41.96										
l	Nº	220	68	173	48	139	40	98	29	65	23	27	11	2	4
b	A	599.85	574.13	946.07	902.13	1312.63	1292.03	1702.63	1702.72	2082.03	2024.17	2343.22	2354.27	2775.50	2619.50
	SD	150.47	147.06	183.01	185.95	193.20	213.22	200.14	251.36	219.43	216.82	166.37	193.17	125.16	71.51
L	Nº	228		221		179		127		88		38		6	
	A	593.77		936.53		1308.03		1702.65		2066.91		2346.42		2671.50	
	SD	149.82		184.13		197.41		211.85		219.00		171.94		112.65	

2. RESULTS AND DISCUSSION

2. 1. Age at first conception

The average age at first conception (based in lambing data) of ewes born in Spring and Autumn was, respectively, 415.39±119.85 and 441.05±149.80 days (table 1). Differences of age at first conception were not significante when ewes were compared in terms of their birth month.

2. 2. Age at lambing

The results of the average age at lambing are summarized in table 2. Differences of age at first lambing were not significant in ewes of single birth and double birth, confirm others results (Rebello Andrade et al., 1987; Várzea Rodrigues et al., 1989). However, considering both averages, the age average at first lambing of double birth seems more favourable (574.13±147.06 vs 599.85±150.47 days) (fig. 1) as in 2nd lambing (902.13±185.95 vs 946.07±183.01 days) and 3rd lambing (1292.03 ± 213.22 vs 1312.63 ± 193.20 days).

There were significant diferences ($P<0.01$) in the ages at first lambing among ewes of single birth and between all ewes, when the tipe of their birth was not considered, and during the birth years considered (1981-1987). Apparently these results are due to management options and they are possibly associated to feeds availabilities during the animals growth.

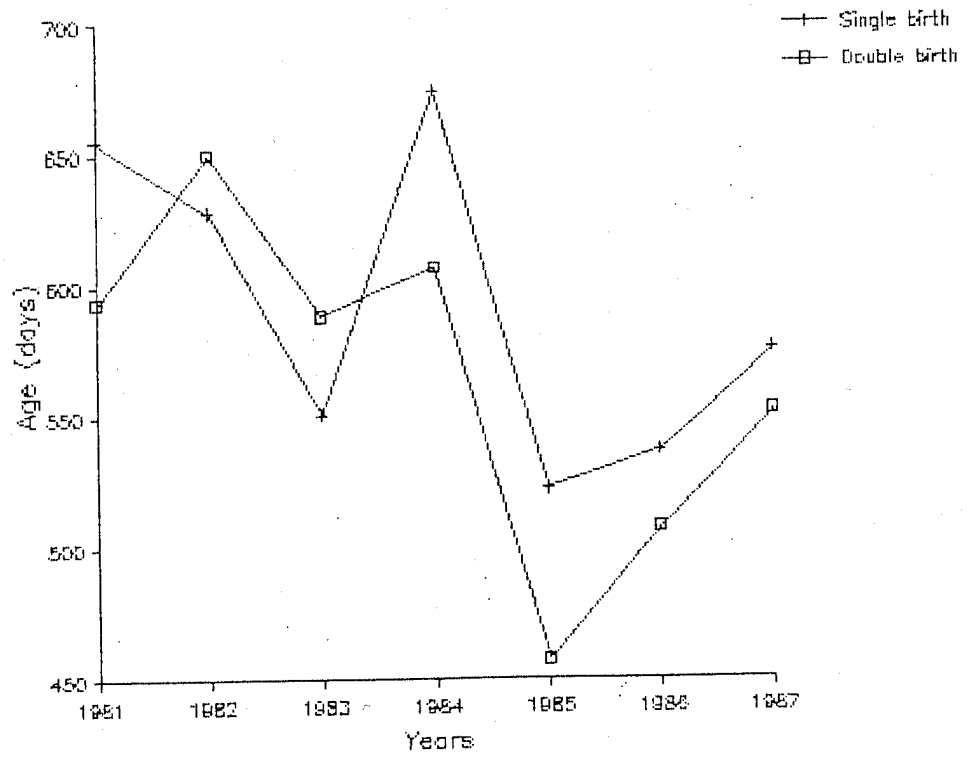

Fig. 1. Evolution of age at 1th. lambing, according to the birth year

TABLE 3. Lambing interval according to lambing season and month

	SPRING LAMBING				AUTUMN LAMBING				
	JAN	FEB	MAR	APR	AUG	SEP	OCT	NOV	DEC
IP NUMBER	164	123	21	13	78	514	356	65	34
AVERAGE	335.76	328.12	322.48	352.92	392.50	391.42	378.22	340.17	294.32
SD	73.36	83.10	68.36	113.91	57.21	79.58	64.17	47.77	68.84

TABLE 4. Lambing interval (season and total)

	J.F.M.A.	A.S.O.N.D.	TOTAL	D.J.F.M.	A.S.O.N.
IP NUMBER	321	1047	1368	342	1013
AVERAGE	332.66	380.67	369.41	328.08	383.58
SD	79.31	73.81	77.66	76.94	72.23

BLE 5. Lambing interval, according to lambing season, month and age.

	SPRING LAMBING					AUTUMN LAMBING					
	JAN	FEB	MAR	ABR	TOTAL/SEA./AGE	AUG	SEP	OCT	NOV	TOTAL/SEA./AGE	TOTAL
2]											
	35	47	11	7	100	-	25	33	10	68	168
	309.20	317.89	298.82	397.57	318.33	-	417.16	374.54	330.70	383.77	344.82
D	76.21	72.61	58.59	143.95	80.10	-	80.72	69.12	20.43	74.50	84.07
3]											
N	25	18	4	-	47	-	26	92	15	133	180
A	347.92	347.00	318.50	-	345.06	-	383.92	371.11	354.87	371.78	364.81
SD	58.80	84.69	25.04	-	67.55	-	44.96	73.51	52.41	66.79	67.83
4]											
N	18	11	4	-	33	3	49	52	9	113	146
A	341.44	358.64	321.25	-	344.83	442.33	393.08	391.79	356.22	390.86	380.43
SD	54.83	80.40	32.06	-	62.09	66.43	75.15	66.03	62.20	108.22	101.35
5]											
N	19	18	1	-	38	-	34	28	-	62	100
A	378.26	322.94	316.00	-	350.42	-	431.21	384.32	-	410.03	387.38
SD	49.07	81.77	-	-	70.99	-	78.00	65.39	-	75.74	79.15
6]											
N	25	5	1	-	31	-	9	10	7	26	57
M	371.64	343.00	334.00	-	365.80	-	393.56	371.60	342.71	371.42	368.37
DP	36.00	59.32	-	-	40.68	-	40.85	56.84	19.77	46.88	43.31
7]											
N	-	-	-	-	-	-	-	7	-	7	7
M	-	-	-	-	-	-	-	352.57	-	352.57	352.57
DP	-	-	-	-	-	-	-	16.64	-	16.64	16.64
TAL / MONTH											
N	122	99	21	7	246	3	143	222	41	409	658
A	329.90	329.90	309.33	397.57	337.68	442.33	404.72	377.57	347.20	384.49	366.78
SD	75.94	75.94	45.86	143.95	71.76	66.43	72.38	68.39	44.71	70.06	71.22

2. 3. Lambing interval

The analysis of lambing interval (IP) classified according to lambing season and month (table 3 and 4) shows significant differences ($P<0.01$) in what concerns the seasons, Spring vs Autumn (318.33±80.10 vs 383.77±74.50 days)(fig 2).

The IP analysis classified according to lambing season, month and age (table 5) shows significant differences ($P<0.01$) in what concerns the age (fig 3). The significant difference ($P<0.01$) of the lambing month seems to be minly due to the season effect.

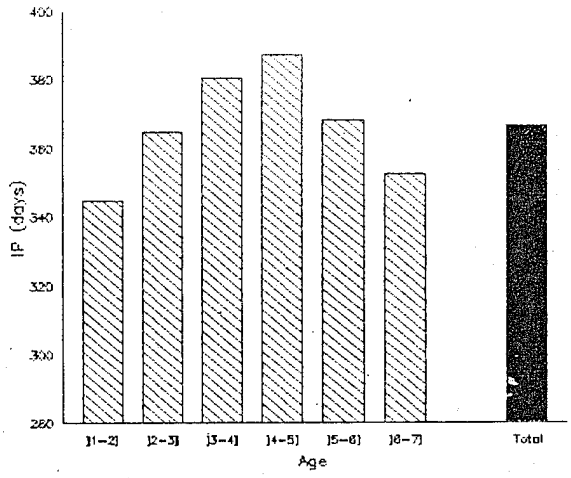

Fig. 2. Average lambing interval, for groups of age

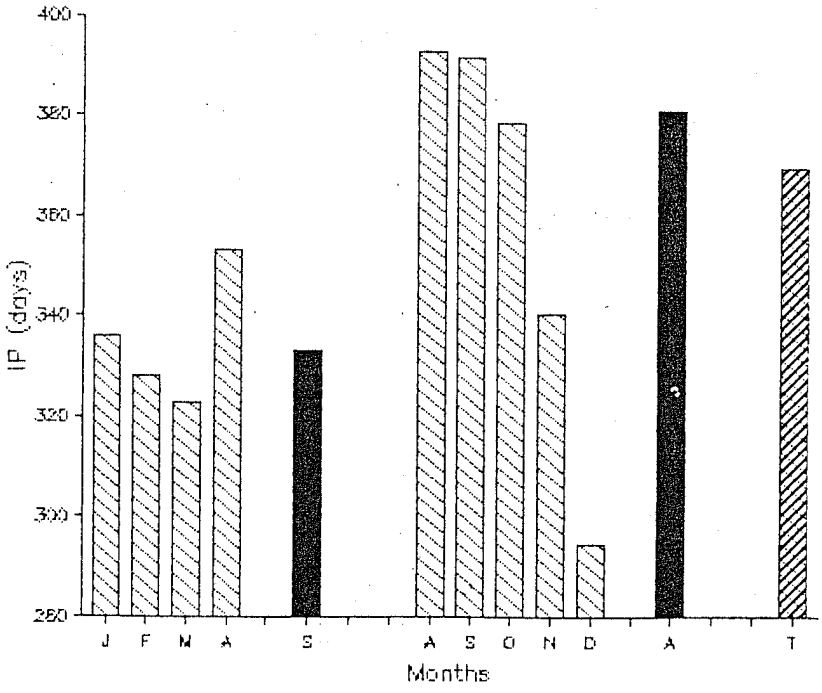

Fig. 3. Average lambing interval, conditioned by the month of lambing.

TABLE 6. Some reproductive parameters according to reproduction season of the total number of B.B. Merino sheep at the ESACB (1982-87)

Reproductive parameters	Spring mating	Autumn mating	Total
Apparent fertility rate (%)	76.4	55.4	86.6
Prolificacy rate (%)	114.4	113.5	114.2
Fecundity rate (%)	87.4	62.9	98.9
Total mortality (%)	5.8	8.2	6.3
Numerical productivity (%)	82.4	57.7	92.7
% Single lambings	85.6	86.5	85.8
% Double lambings	14.4	13.5	14.2
% Single birth lambs	74.9	76.2	74.1
% Double birth lambs	25.1	23.8	24.9

Rebello Andrade et al.,1987

TABLE 7. Some reproductive parameters according to reproduction season of the total number of B.B. Merino sheep at the ESACB (1987-88)

Reproductive parameters	Spring mating	Autumn mating	Total
Apparent fertility rate (%)	82.7	89.3	85.9
Prolificacy rate (%)	108.0	116.5	112.3
Fecundity rate (%)	89.3	103.9	96.4
Total mortality (%)	9.2	7.2	8.2
Numerical productivity (%)	81.7	97.5	89.4
% Single lambings	90.4	82.2	86.2
% Double lambings	9.6	17.8	13.8
% Single birth lambs	84.6	70.7	77.2
% Double birth lambs	15.4	29.3	22.8

2. 4. Apparent fertility rate

Results published relate 86.6% annual apparent fertility rate varies from 55.4% during Autumn reprodutive season to 76.4% during the Spring reprodutive season in global (1982-87) the apparent fertility rate was 76.4% in Spring vs 55.4% Autumn (table 6) Rebello Andrade et al., 1987). That low percentage should be explained by the characteristics of the reprodutive management practised, because it considers Spring the main reprodutive season.

The study with altered reprodutive management (two autonoms herds without ewes transferences) the results are distinct; apparent fertility rate are 82.7% in Spring mating and 89.3% in Autumn mating (table 7). The fluctuation of the apparent fertility rate during the years considered are table 8, fig 4, varies from 78.0% to 91.3 %. This parameter receives an expected influence of the female age (table 9 and 10).

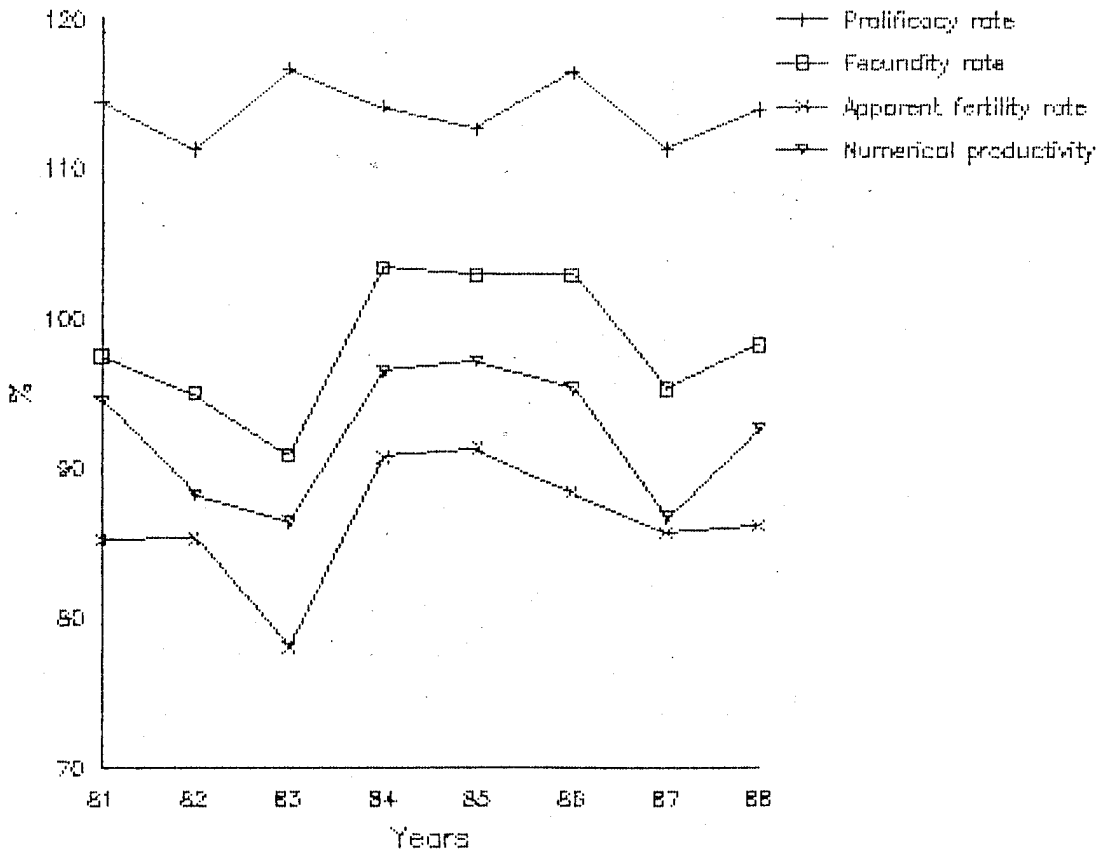

Fig. 4. Reproductive parameters, by years.

TABLE 8. Reproductive parameters, per years, of the total number of Beira Baixa Merino sheep at ESACB (1981-1988)

Reproductive parameters	Years							
	1981	1982	1983	1984	1985	1986	1987	1988
Apparent fertility rate (%)	85.2	85.3	78.0	90.7	91.3	88.4	85.7	86.2
Prolificacy rate (%)	114.3	111.2	116.6	114.1	112.6	116.4	111.2	113.9
Fecundity rate (%)	97.4	94.9	90.9	103.4	102.9	102.9	95.2	98.2
Total mortality (%)	3.0	7.0	5.0	6.3	5.6	7.4	9.0	6.3
Numerical productivity (%)	94.4	88.2	86.4	96.4	97.1	95.3	86.7	92.7
% Single lambings	85.7	88.8	83.4	85.9	87.4	83.6	88.8	84.5
% Double lambings	14.3	11.2	16.6	14.1	12.6	16.4	11.2	15.5
% Single birth lambs	74.9	79.8	71.5	75.3	77.5	71.8	79.9	74.7
% Double birth lambs	25.1	20.2	28.5	24.7	22.5	28.2	20.1	25.3

TABLE 9. Reproductive parameters, per age groups, of the total number of Beira Baixa Merino sheep at ESACB (1981-1988)

Reproductive parameters	Age groups (years)							
	+1	+2	+3	+4	+5	+6	+7	+8
Apparent fertility rate (%)	86.2	91.2	92.0	90.8	89.4	90.2	87.2	84.2
Prolificacy rate (%)	111.4	112.5	114.7	120.1	119.4	118.6	111.0	112.5
Fecundity rate (%)	96.1	102.5	105.5	109.0	106.7	106.9	96.8	94.7
Total mortality (%)	6.3	5.7	5.4	5.6	5.7	5.8	5.5	22.2
Numerical productivity (%)	90.0	96.7	99.8	102.9	100.6	100.7	91.5	73.7
% Single lambings	88.6	87.5	85.3	80.0	80.6	81.4	89.0	87.5
% Double lambings	11.4	12.5	14.7	20.0	19.4	18.6	11.0	12.5
% Single birth lambs	79.6	77.8	74.3	66.6	67.5	68.6	80.2	77.8
% Double birth lambs	20.4	22.2	25.7	33.4	32.5	31.4	19.8	22.2
Survival at birth	96.9	97.1	97.5	98.1	97.4	96.6	95.6	83.3
Survival, birth to weaning	96.8	97.1	97.0	96.3	96.8	97.5	98.9	93.3

2. 5. Prolificacy rate rate

The prolificacy rate show no differences in what concerns the reproductive season (114.4% during Spring vs 113,3% during Autumn) (Rebello Andrade et al., 1987), in autonoms herds prolificacy rate was 108.0% Spring mating season and 116.5% in Autumn mating season.

Prolificacy rate differ with age, the fluctuation of the prolificacy rate during the years are not big (table 8, fig 4). This parameter receives and expect influence of the female age (from 100.7% in two-years-old ewes to 120.5% in six-years-old ewes (table 10).

2.6. Fecundity rate

The fecundity rate develops close to the apparent fertility rate (table 8-10).

We can observed the best fecundity rate in five-years-old ewes (109.6%) (fig.5).

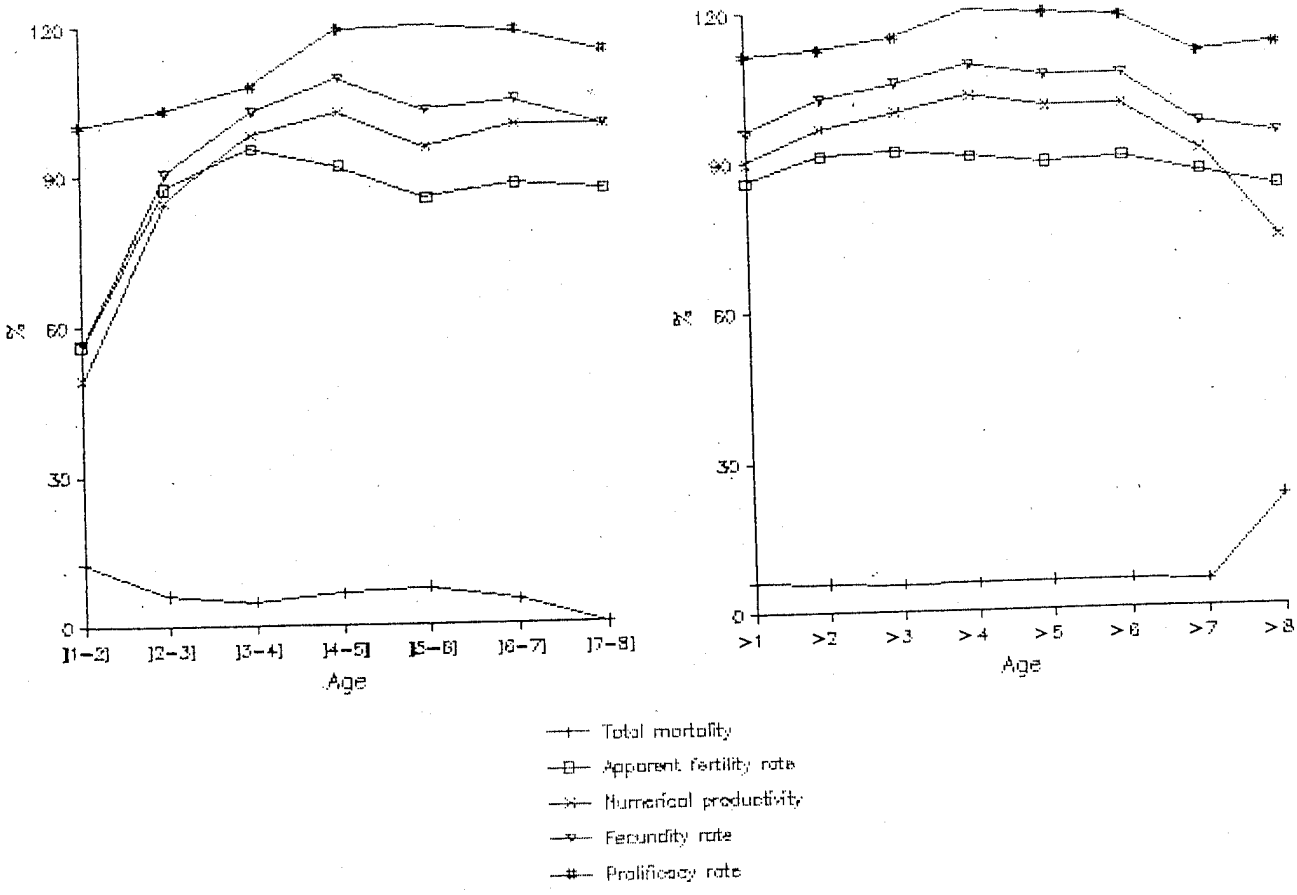

Fig. 5. Reproductive parameters, by groups of age.

TABLE 10. Reproductive parameters, per age, of the total number of Beira Baixa Merino sheep at ESACB (1981-1988)

Reproductive parameters	Age (years)						
	]1-2]	]2-3]	]3-4]	]4-5]	]5-6]	]6-7]	]7-8]
Apparent fertility rate (%)	56.2	87.5	95.3	91.7	85.5	88.1	87.0
Prolificacy rate (%)	100.6	103.2	107.9	119.4	120.5	119.2	115.0
Fecundity rate (%)	56.6	90.3	102.8	109.6	103.1	105.8	100.0
Total mortality (%)	12.6	6.1	4.6	6.4	7.4	4.8	0
Numerical productivity (%)	49.5	84.8	98.1	102.6	95.4	100.0	100.0
% Single lambings	99.4	96.8	92.1	80.6	79.5	80.8	85.0
% Double lambings	0.6	3.2	7.9	19.4	20.5	19.2	15.0
% Single birth lambs	98.7	93.9	85.4	67.4	65.9	67.7	73.9
% Double birth lambs	1.3	6.1	14.6	32.6	34.1	32.3	26.1
Survival at birth	94.3	97.3	96.8	99.4	98.5	98.4	100.0
Survival, birth to weaning	92.7	96.5	98.6	94.2	94.0	96.7	100.0

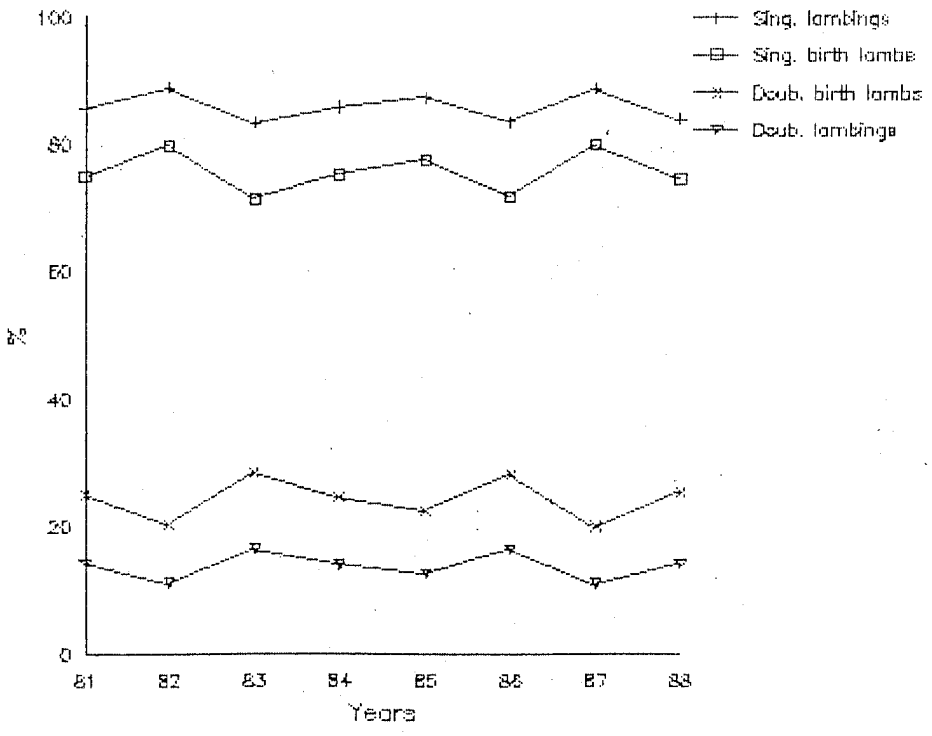

Fig. 6. Percentages of single and double lambing, single and double birth lambs, by years.

2.7. Total mortality rate

The total mortality rate decreases with age, varying from 12.6% in ewes up to two-years old to 4.8% in seven-years-old ewes (table 10).

The 22.2% mortality rate in ewes with more than eight-years-old (table 9) is not consistent, only reported a few number of ewes.

2.8. Numerical productivity

The fluctuation of this parameters, during the years, are in table 8.

The numerical productivity has a favourable evolution as the ages increases from 2 to 5 years (49.5 vs 102.6% (table 10).

2. 9. Percentages of single and double lambings single and double Birth lambs.

The fluctuation of these parameters, during the years considered, are not big (table 8).

These parameters develop with age, which tends to bring the percentages near (table 9-10) (fig.7)

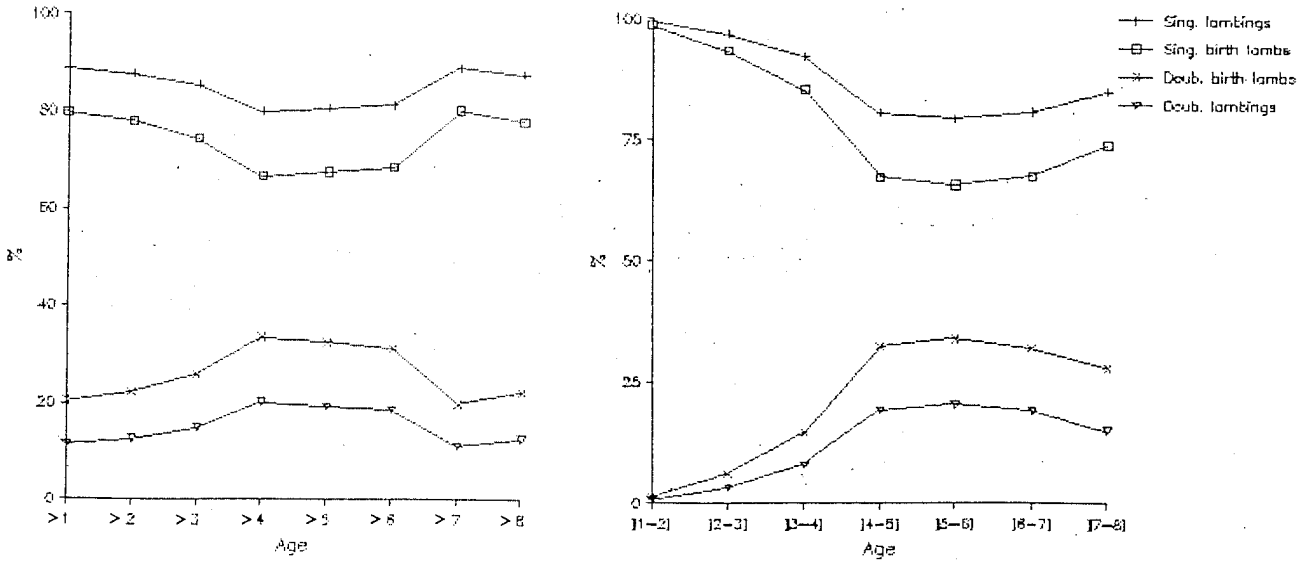

Fig. 7. Percentages of single and double lambing, single and double birth lambs by groups of age.

RESUMO

Recolheu-se, ordenou-se e estruturou-se um conjunto de dados do efectivo ovino Merino beira Baixa da Escola Superior Agrária de Castelo Branco (Portugal) obtidos entre 1981 e 1989.

A idade média ao primeiro parto em função do tipo de nascimento das fêmeas (simples ou duplo) foi respectivamente de 599.85±150.47 dias e de 574.13±147.06 dias, não sendo significativas as diferenças verificadas. Porém este parâmetro revelou-se influenciado pelo "ano" (P<0.01). O intervalo entre partos mostrou-se dependente não dos meses de partições dentro de épocas mas sim entre as duas épocas de partos (Janeiro a Abril 332.66± dias e Agosto a Dezembro 380.67±73.81 dias.

O intervalo entre partos apresentou ainda diferenças (P>0.01) para a idade ao parto.

A taxa de fertilidade aparente, taxa de prolificidade e taxa de pruductividade numerica são, respectivamente em 1981-87 e 1987-88, 86.6% vs 85.9%, 114.2% vs 112.3% e 92.7% vs 89.4%. Todas estas taxas sofrem influencia esperada da idade da femea ao parto.

Os parametros reprodutivos calculados sobre o periodo de maneio reprodutivo modificado (dois rebanhos autonomos sem transferencia de ovelhas) foram favoráveis a época de cobrição de Outono.

Foram calculados outros parâmetros reprodutivos, sendo incluída a sua análise.

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REFERENCES

DESVIGNES, A. 1968. Propuesta de terminilogia de los criterios de reproduccion. Proc. FEZ. Dublin.

PINTO DE ANDRADE, V. A.; FRAGOSO DE ALMEIDA, J. P.; MATOS ALMEIDA, L. F.; VÁRZEA RODRIGUES, J. P.; REBELLO DE ANDRADE, C. S C. 1987. Merino da Beira Baixa, contribuição para o seu estudo. Instituto Politécnico-Escola Superior Agraria de Castelo Branco. Castelo Branco.

REBELLO DE ANDRADE, C.; VÁRZEA RODRIGUES, J. P.; FRAGOSO DE ALMEIDA, J. P. 1987. Contribuction for a characterizaction of Beira Baixa Merino. 38a Annual Meeting of the EAAP. Lisbon.

SNEDECOR, G. W.; COCHORAN, W. G. 1980. Statistical methods. 2nd ed. Iowa State University Press. Iowa.

SOBRAL, M. 1986. Nota sobre a ovinicultura em Portugal. Direcção Geral da Pecuária. Lisboa.

VÁRZEA RODRIGUES, J. P.; REBELLO DE ANDRADE, C. S. C.; FRAGOSO DE ALMEIDA, J. P. 1989. Contribuição para a caracterização reprodutiva do Merino da Beira Baixa. IV Simpósio Internacional de Reprodução Animal. Lisboa