XXXVIII Reunião Anual da Federação Europeia de Zootecnia
XXXVIII Annual Meeting of the European Association for Animal Production

Lisbon, September 27th - October 1st 1987

CONTRIBUCTION FOR A CHARACTERIZATION OF BEIRA BAIXA MERINO

REPRODUCTIVE, PRODUCTIVE AND GENECTIC PARAMETERS OF A FLOCK

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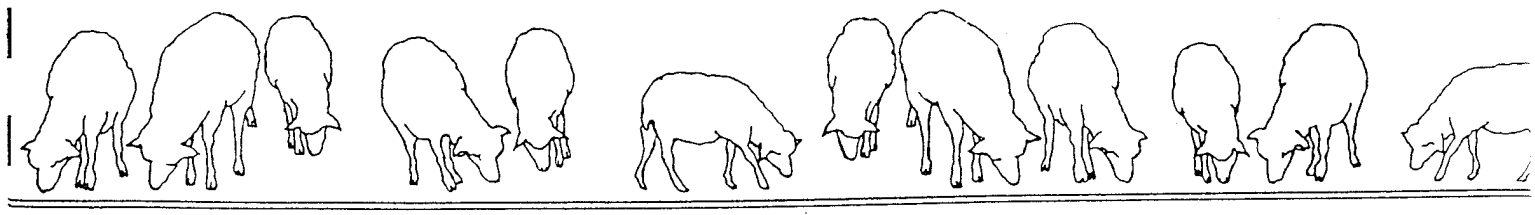


ESCOLA SUPERIOR AGRÁRIA
INSTITUTO POLITÉCNICO DE CASTELO BRANCO

CONTENTS

S U M M A R Y

A collection and sellection of data has been carried on the Merino Beira Baixa sheep at the Escola Superior Agrária (Agriculture School) in Castelo Branco (ESACB) in Portugal from 1981 to 1987. According to the birth type of females (single or double), their average age at the time of first lambing amounted to 600,10 ± 158,86 days and to 583,90 ± 159,78 days. Differences were not significant. However this parameter was influenced by the "year" factor ($P < 0,01$). It was shown that the intervals between lambings (I.P.) did not depend on the parturition months inside the seasons, but depended on parturition months between the two parturition seasons (from january to March 296,4 ± 64,22 days and from September to November 380,0 ± 71,5 days). The "I.P." revealed significant differences ($P < 0,01$) in terms of the conception age. The average apparent fertility rate amounted to 86,6%, the prolificacy to 114,2% and the average numerical productivity to 92,7%. All these rates were influenced by the ewes age at lambing. Analysis was carried on further reproductive parameters.

The average weight at birth and weaning (60 days of age) was 3,34+ ± 0,56 Kg and 12,80 ± 2,44Kg for males (single), 3,02 ± 0,51 Kg and 11,45 ± ± 2,01 Kg for females (single). There were significant differences registered (both on females and males) in terms of lactaction number of ewes ($P < 0,01$ and $P < 0,05$). For double, the average weight at birth and weaning was respectively 2,39 ± 0,45 Kg and 9,77 ± 1,82 Kg for males, 2,31 ± 0,48 Kg and 8,63 ± 2,89 Kg for females. The daily live weight gain between 10 - 30 and 30 - 70 days of age in females (single) was 162 ± 50 g and 145 ± 49 gr respectively, and por males it amounted to 170 ± 59 gr and 140 ± 51 gr respectively. The average milk production (0 - 150 days of lactation) amounted to 46,3 liters. The average greasy wool production per head was 2,49 ± 0,63 Kg.

Fenotipical parameters were determined. The heritability of milk production (2b) was $h^2 = 0,1026$. As one may observe from the standard deviation of valuation (0,1039) the amount of data does not yet allow an accurate estimation of this parameter.

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.

This study was carried on a flock belonging to the autochthon breed Beira Baixa Merino. The name given to this breed although a recent one, implies an evolution of the sheep mentioned in 1870.

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 rams (SOBRAL, 1986) which represents more or less 8% of the total number of sheep in the country.

The aim of this article is to contribute to the characterization of the Beira Baixa Merino by determining productive parameters (of a single flock). We hope the collected data will function as ground work for further research, which will ultimately aim at the establishment of a selection programme capable of coping with the present low to medium biologic productivity.

It is not the aim of this study to reach final conclusions in what concerns the potenciality of the breed. It should also be refered that the data found constitute the starting point of a wider project to be begun during this year.

MATERIAL AND METHODS

The data presented in this article were collected from the total number of sheep at the Escola Superior Agrária in Castelo Branco from 1981 to 1987.

The animals are raised in pastures the whole year through, using 40 ha area of barren land with an average of 7 sheep/ha.

During the winter season, there is an additional diet based on oats and vetch hays. And during lactaction periods the ewes get a supplemental diet of commercial concentrate (200-300g/per head per 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 lamb's weights at the "Type" ages were determined through linear interpolation.

The milk production was determined based on fortnightly contrasts of two milkings (in the morning and in the afternoon) using the FLEISCHMAN method (SAN PRIMITIVO, 1984) as estimation.

The milk production normalization was obtained by linear interpolation, having previously fixed 0 and 150 days as limits.

The correction of milk productions was done for the effects "year" and "Lambing season" using the following model:

$$Yij = \mu + \alpha i + ej \qquad \text{(TORO, 1985)}$$

The heritability (h^2) estimation for milk production was done though a regression mother - daughter (2b) (JOHANSEN and RENDEL, 1971 ; FALCONER 1974) because to the present there isn't a paternity control. The accuracy of the estimate was determined by the method quoted by FALCONER (1974)

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, 1945)

RESULTS AND DISCUSSION

All the tables and statistical analysis are presented in the appendix 1 (Reproductive parameters) and in appendix 2 (Productive parameters).

1. REPRODUCTIVE PARAMETERS

AGE AT FIRST CONCEPTION

The average age at first lambing of ewes born in August, September, October and November (replacement lambs were selected during these months) was 444,24 ± 153,03 (Table 1).

Differences of age at first conception were not significant when ewes were compared in terms of their birth month (table 2)

AGE AT LAMBING

The results of the average age estimate at lambing are summarized in table 3. Differences of age at first lambing were not significant in ewes of single b i r t h and ewes of double birth. However, considering both averages, the age average at first lambing in ewes of double birth seems more favourable (583,90± 159,78 days against 600,10 ± 158,86 days).

There were significant differences ($P < 0,01$) in the ages at first lambing among ewes of single birth and between all ewes when the type of their birth was not considered during the birth years considered (1981/85) (figure 1); Apparently these results are due to management options and they are possibly associated to fees availabilities during the animals growth (tables 4-6).

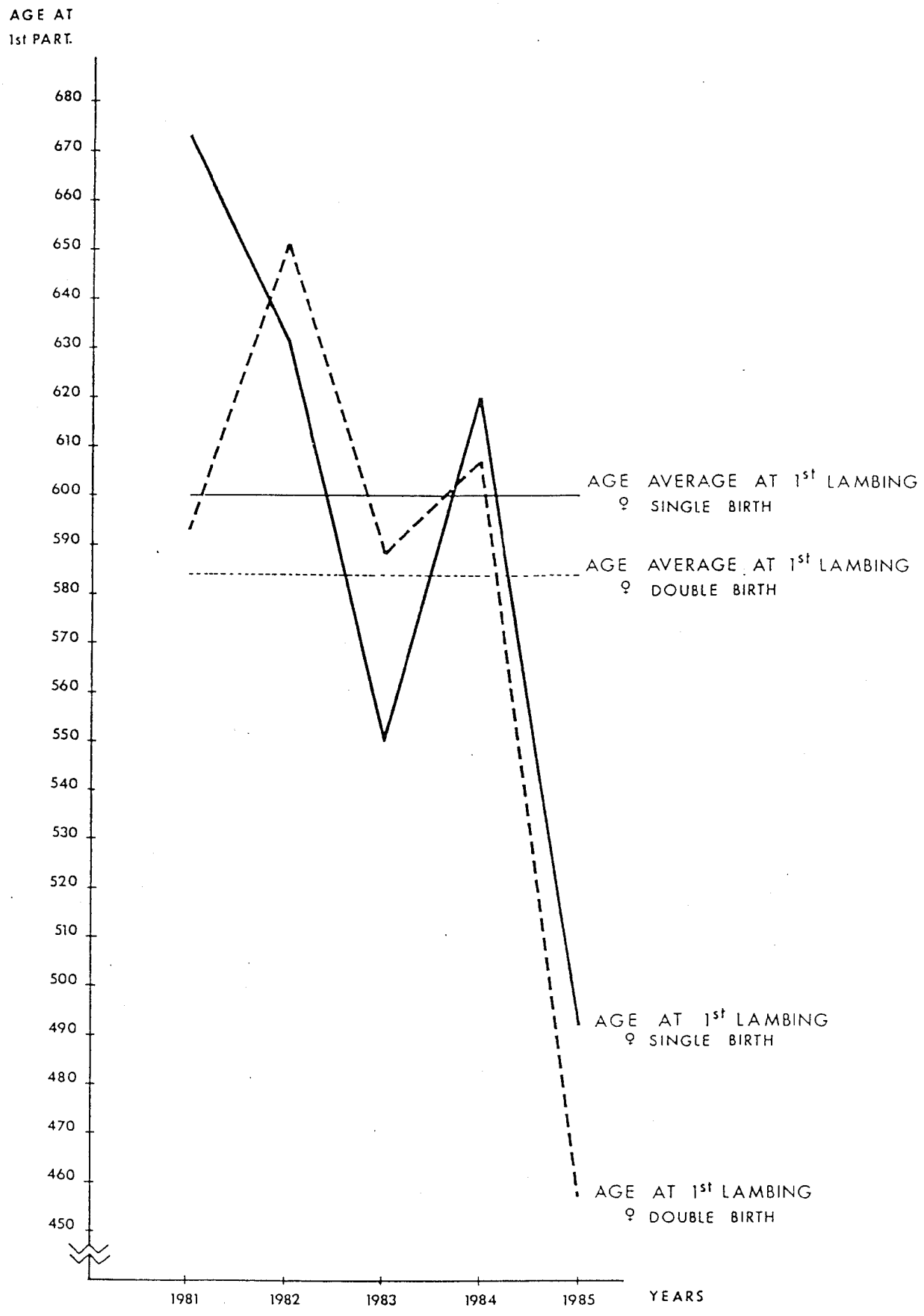


FIG. 1: EVOLUTION OF AGE AT 1st PARTURITION ACCORDING TO THE BIRTH YEAR

INTERVAL BETWEEN LAMBINGS

The analysis of periods between lambings (IP) classified according to lambing season and month (tables 7 - 8) shows significant differences ($P < 0,01$) in what concerns the seasons (figure 2). The IP have significant differences ($P < 0,05$ and $P < 0,01$) during August, September, October, November and August, September, October, November and December respectively. During December, January, February, March and April, differences weren't significant (table 9).

The IP analysis classified according to lambing season, month and age (table 10) shows significant differences ($P < 0,01$) in what concerns the age (table 11) (Figure 3). The significant difference ($P < 0,01$) of the lambing month (table 12) seems to be mainly due to the season effect (table 13)

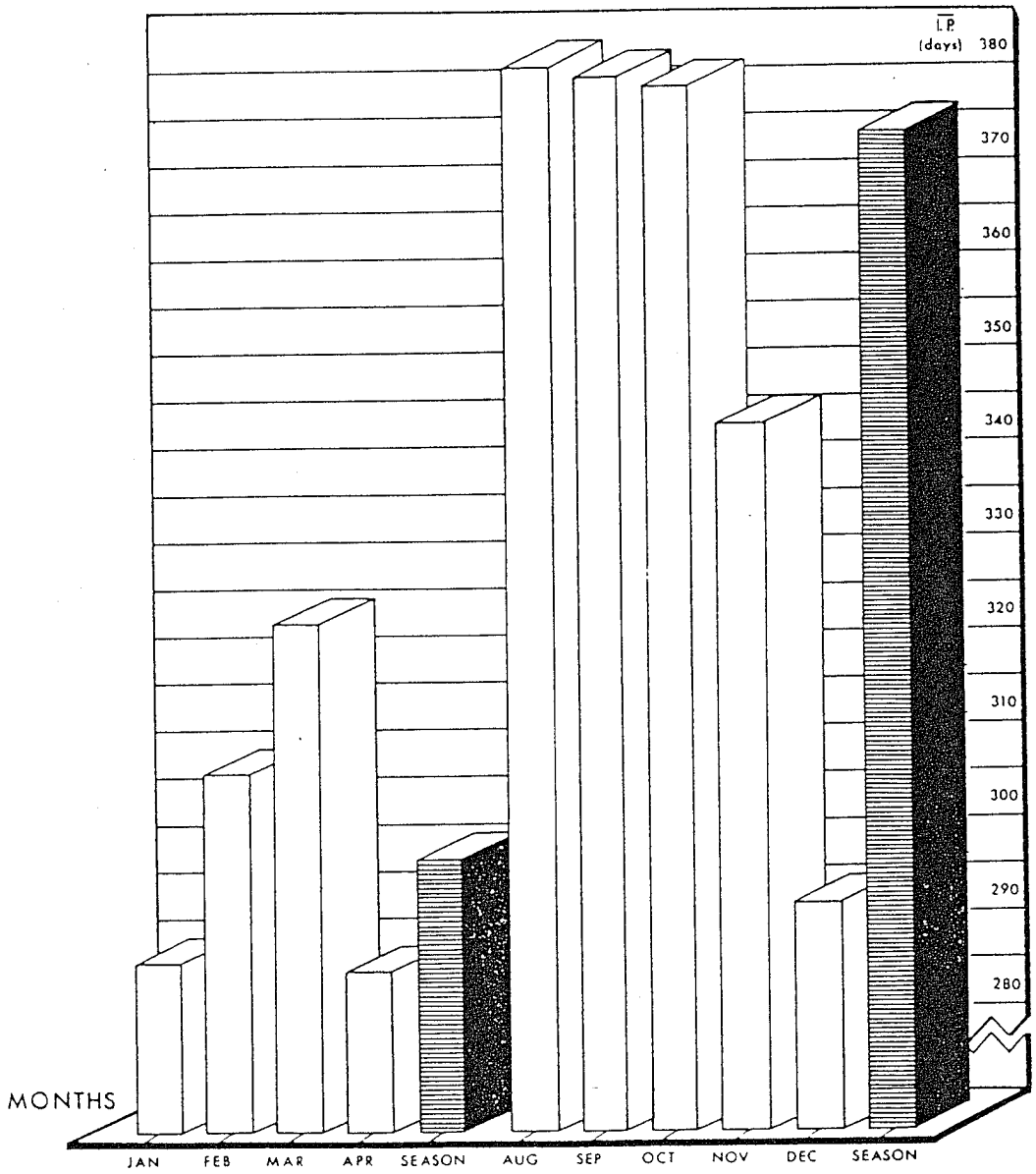


Fig. 2 - Average interval of parturitions, conditioned by the month of lambing.

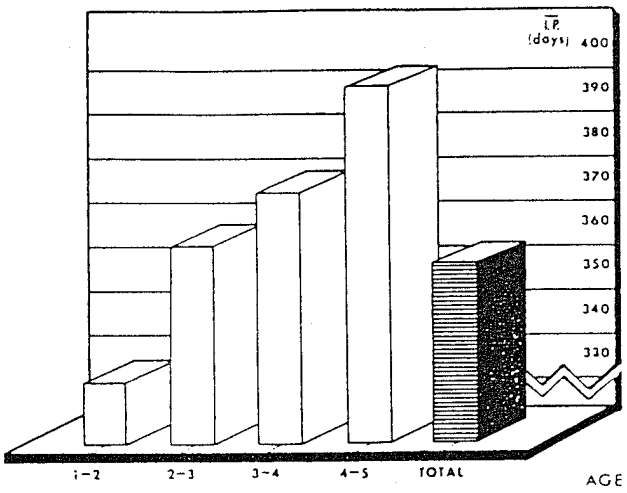
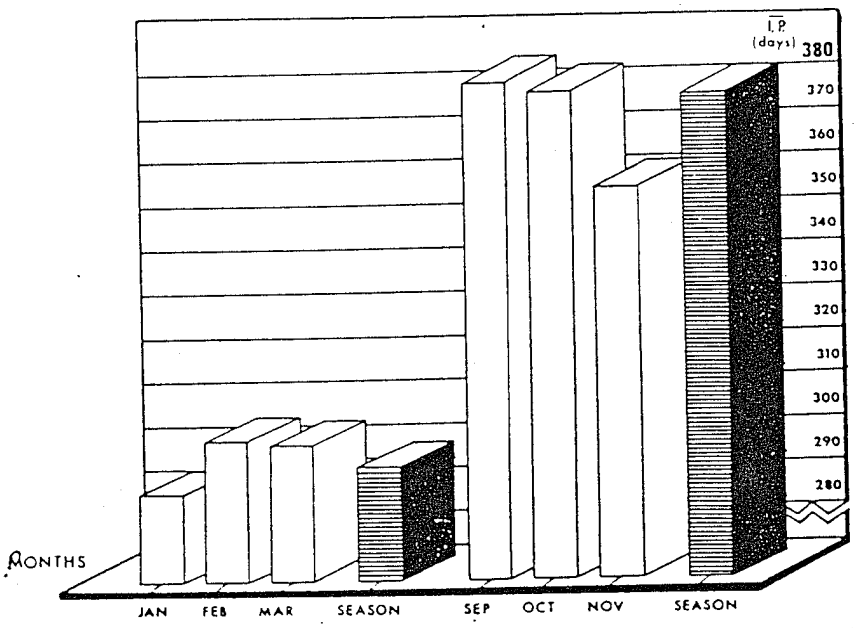


Fig. 3/3A - Average interval of parturitions, for grups of age.



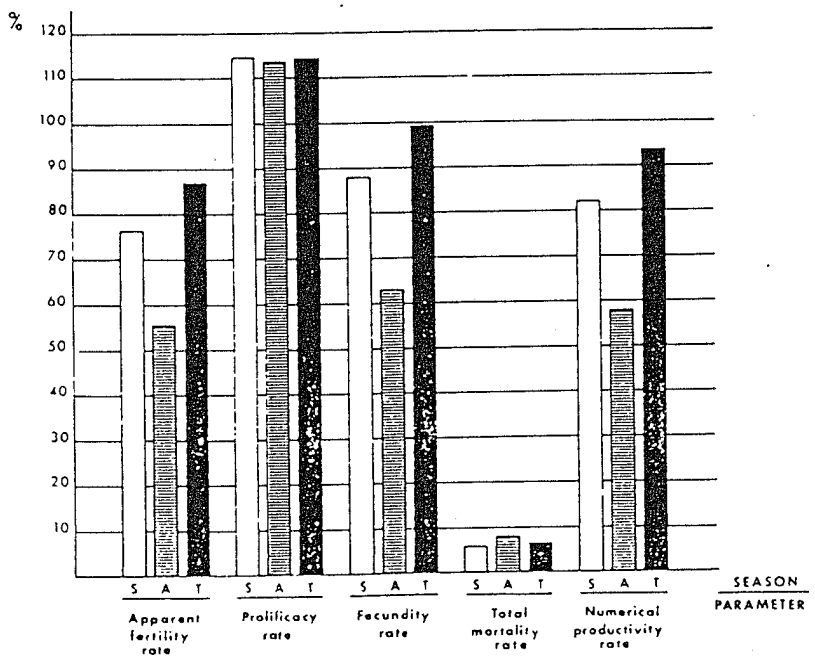


Fig. 4

S - spring mating season
A - autumn mating season
T - total (years 1982/87)

APPARENT FERTILLITY RATE

The annual apparent fertility rate is 86,6%. It varies from 55,4% during the Autumn reproductive season to 76,4% during thespring reproductive season . That low percentage should be explained by the characteristics of the reproductive management practised, because it considers Spring the main reproductive season. The Autumn season iskept for the general improveme of animals which have reached reproductive age and weight for the first time and of animals which weren't in the previous season.

The fluctuation of the apparent fertility rate during the years considered are not big. (table 15) (Figure 5). This parameter receives an expected influence of the females age (tables 16 and 17) (Figure 8).

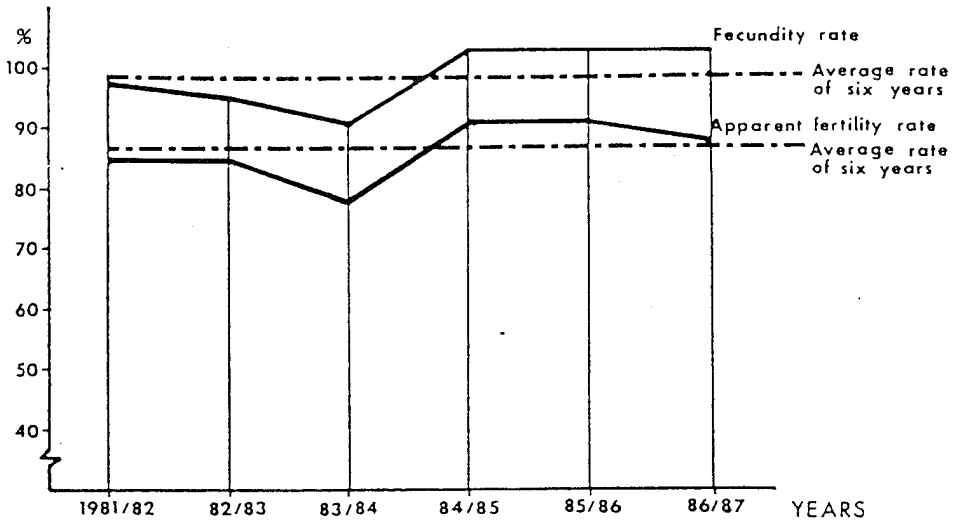


Fig. 5

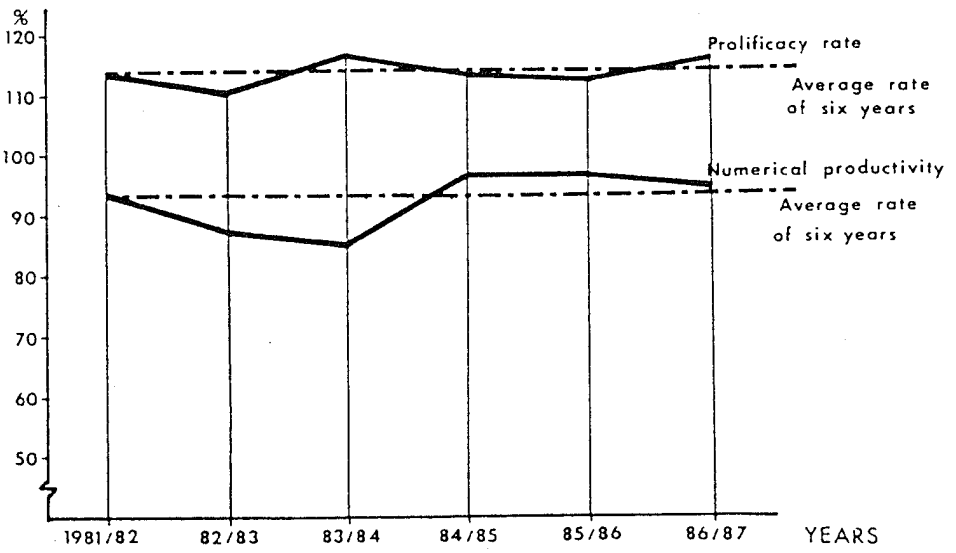


Fig. 6

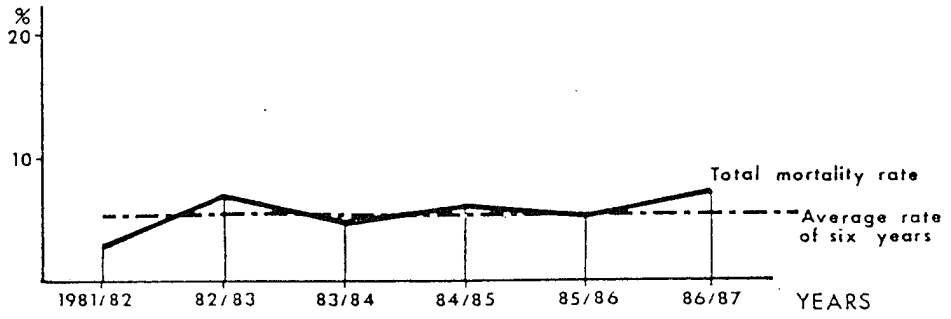

%
20
10
Total mortality rate
Average rate
of six years
1981/82
82/83
83/84
84/85
85/86
86/87
YEARS

Fig. 7

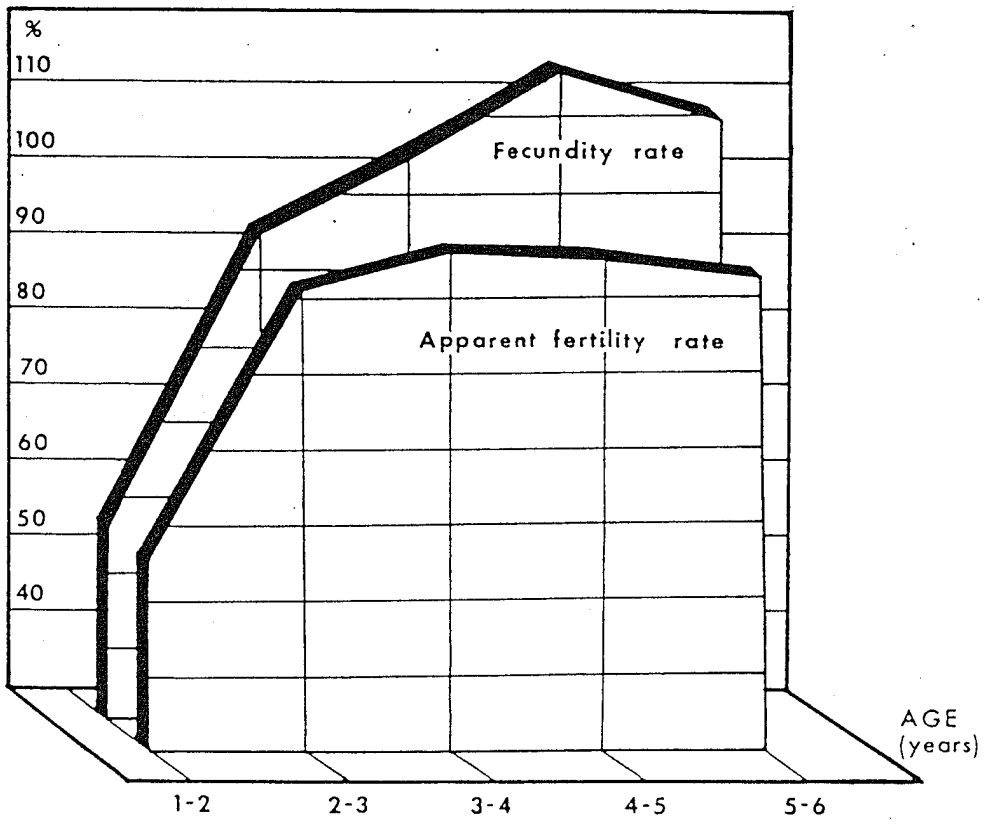

%
110
100
90
80
70
60
50
40
Fecundity rate
Apparent fertility rate
AGE
(years)
1-2
2-3
3-4
4-5
5-6

Fig. 8

PROLIFICACY RATE

The prolificacy rate shows no differences in what concerns the reproductive season (114,4% during spring against 113,5% during Autumn) (table 14); it does however differ with age (from 100,7% in two-years--old ewes to 121,1% in five-years-old ewes). (Table 16) (Figure 9)

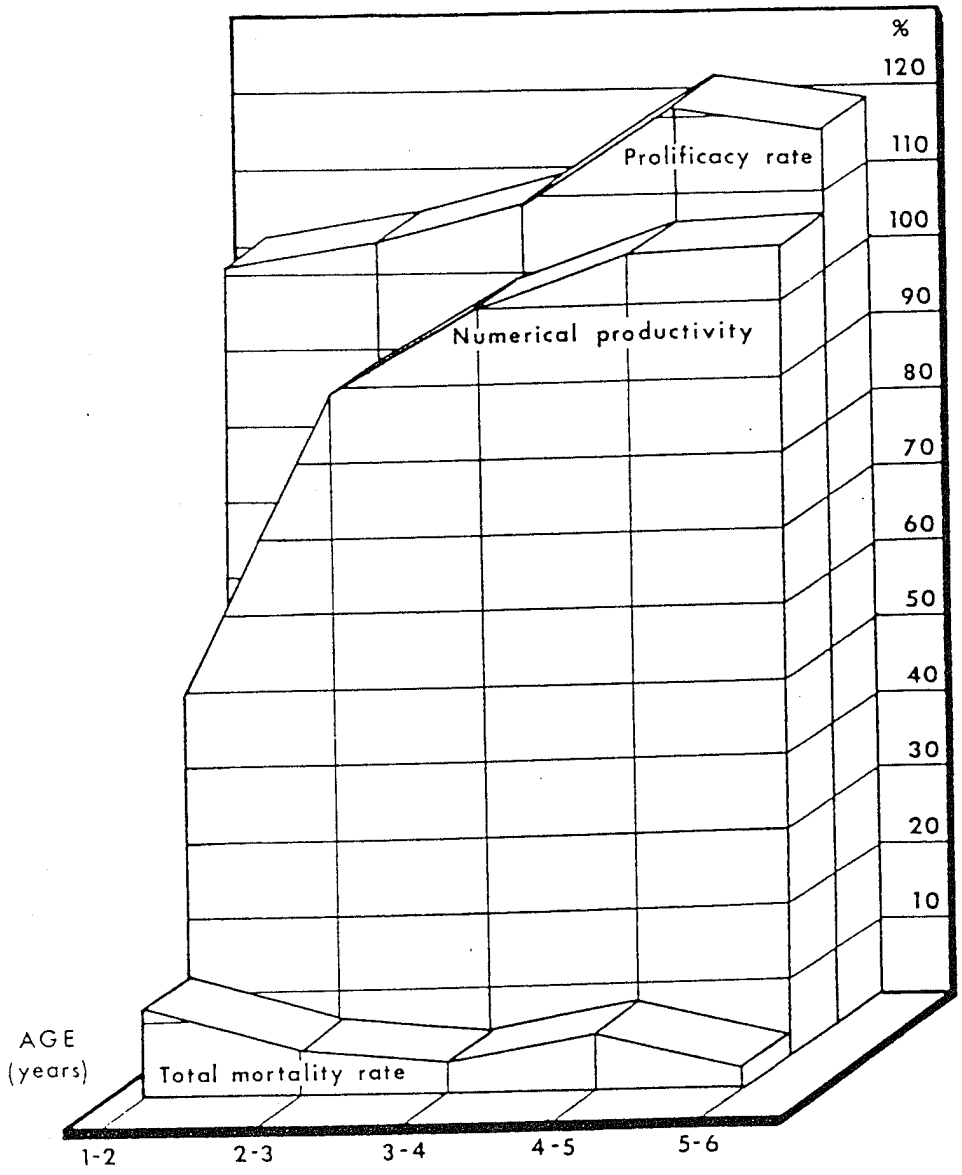


Fig. 9

TOTAL MORTALITY RATE

The total mortality rate decreases with age, varying from 12,2% in ewes up to two- years old to 3% in six-years-old ewes (Figure 9 -10).

FECUNDITY RATE

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

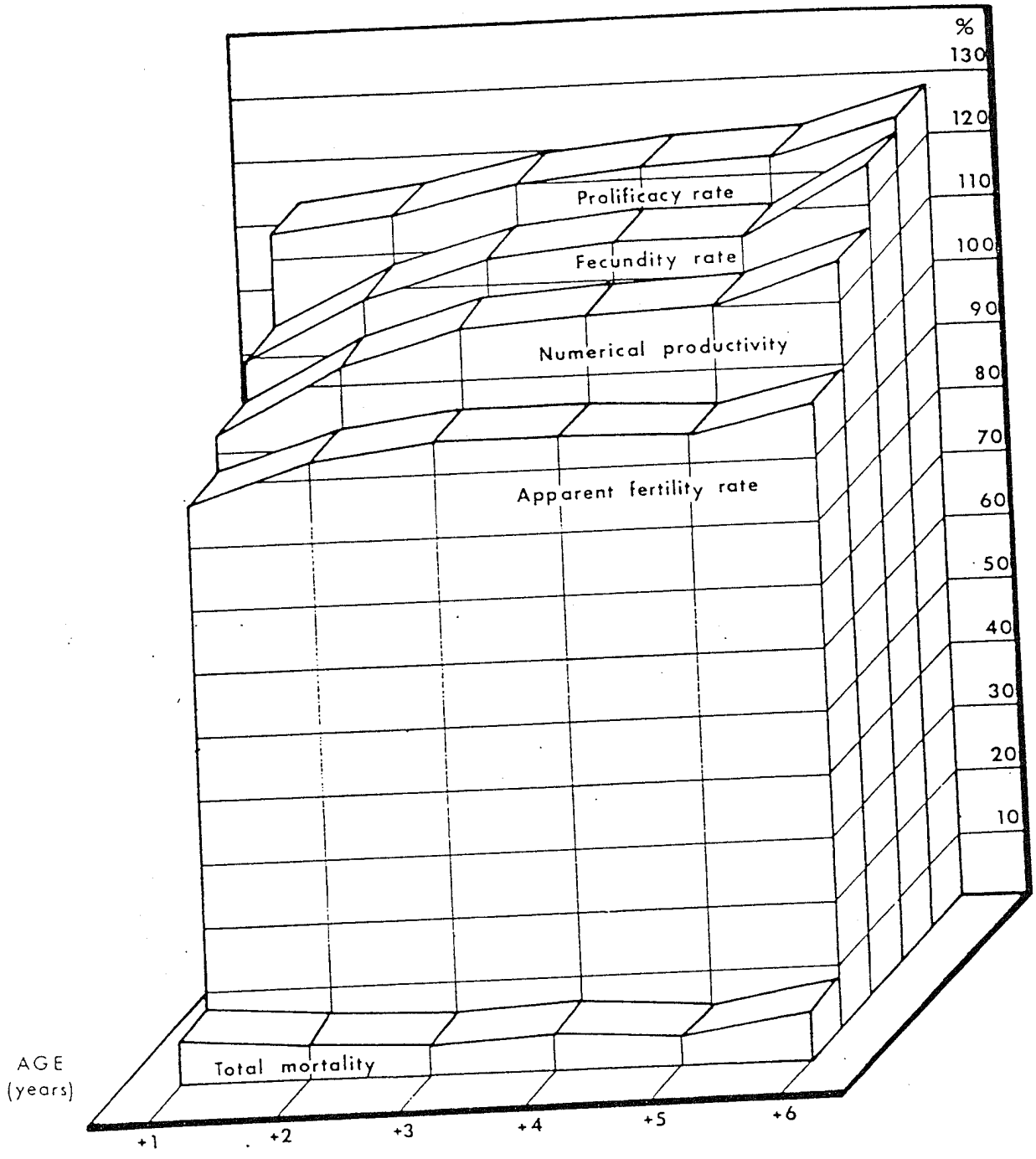


Fig. 10

NUMERICAL PRODUCTIVITY

The numerical productivity has a favourable evolution as the ages increase from 2 to 6years (48,6% against 106,7%) (Figure 9)

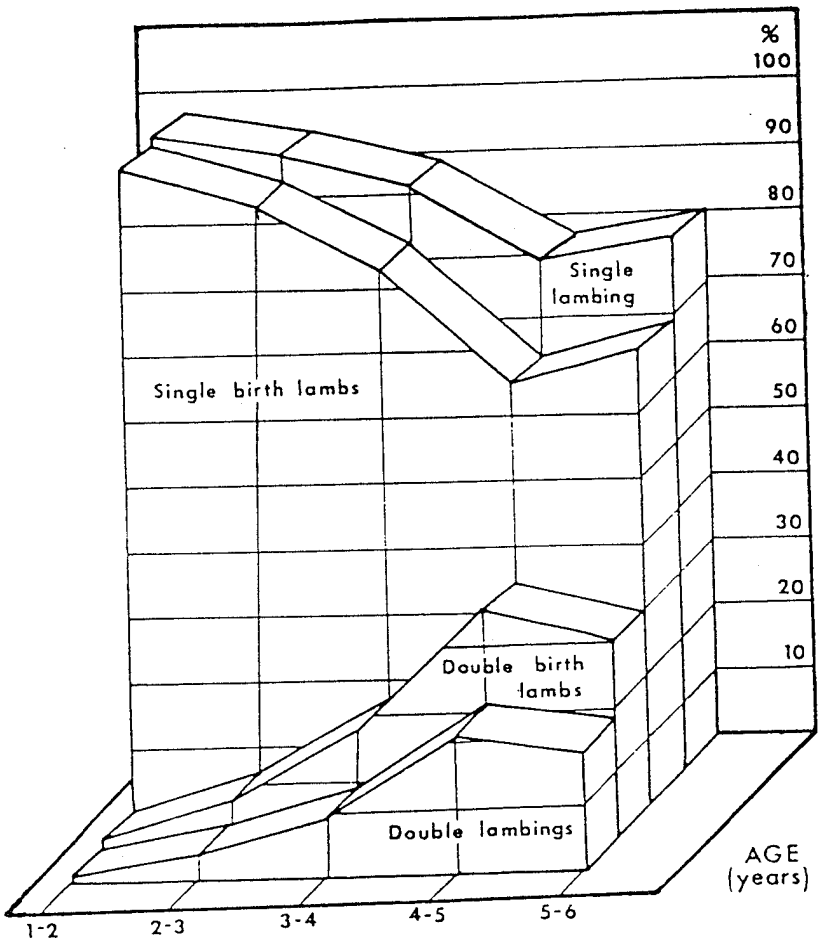

%
100
90
80
70
60
50
40
30
20
10
Single lambing
Single birth lambs
Double birth lambs
Double lambings
AGE (years)
1-2
2-3
3-4
4-5
5-6

Fig. 12

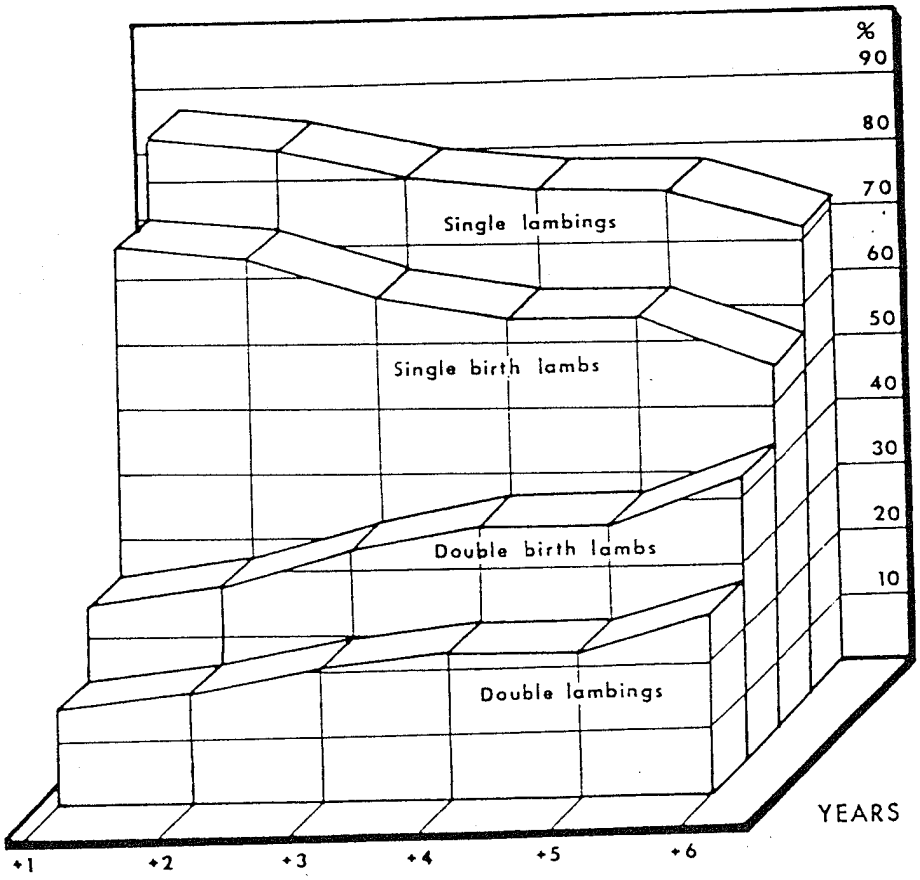

%
90
80
70
60
50
40
30
20
10
Single lambings
Single birth lambs
Double birth lambs
Double lambings
YEARS
+1
+2
+3
+4
+5
+6

Fig. 13

2. PRODUCTIVE PARAMETERS

Data was handled in terms of lambing number of ewes.

BIRTH AND WEANING WEIGHTS

To make sure whether the year had any influence on the weights at birth and weaning time, the lambs were grouped per year and statistically analysed.

The handling of weights in terms of lambing number was significant ($P < 0,01$) for single lambs, excepting the birth weight of single birth females significant for $P < 0,05$. As to double birth lambs only the weaning weigth of males proved to be significant ($P < 0,05$). However, weaning weights of double lambs (males and females grouped together) were highly significant ($P < 0,01$).

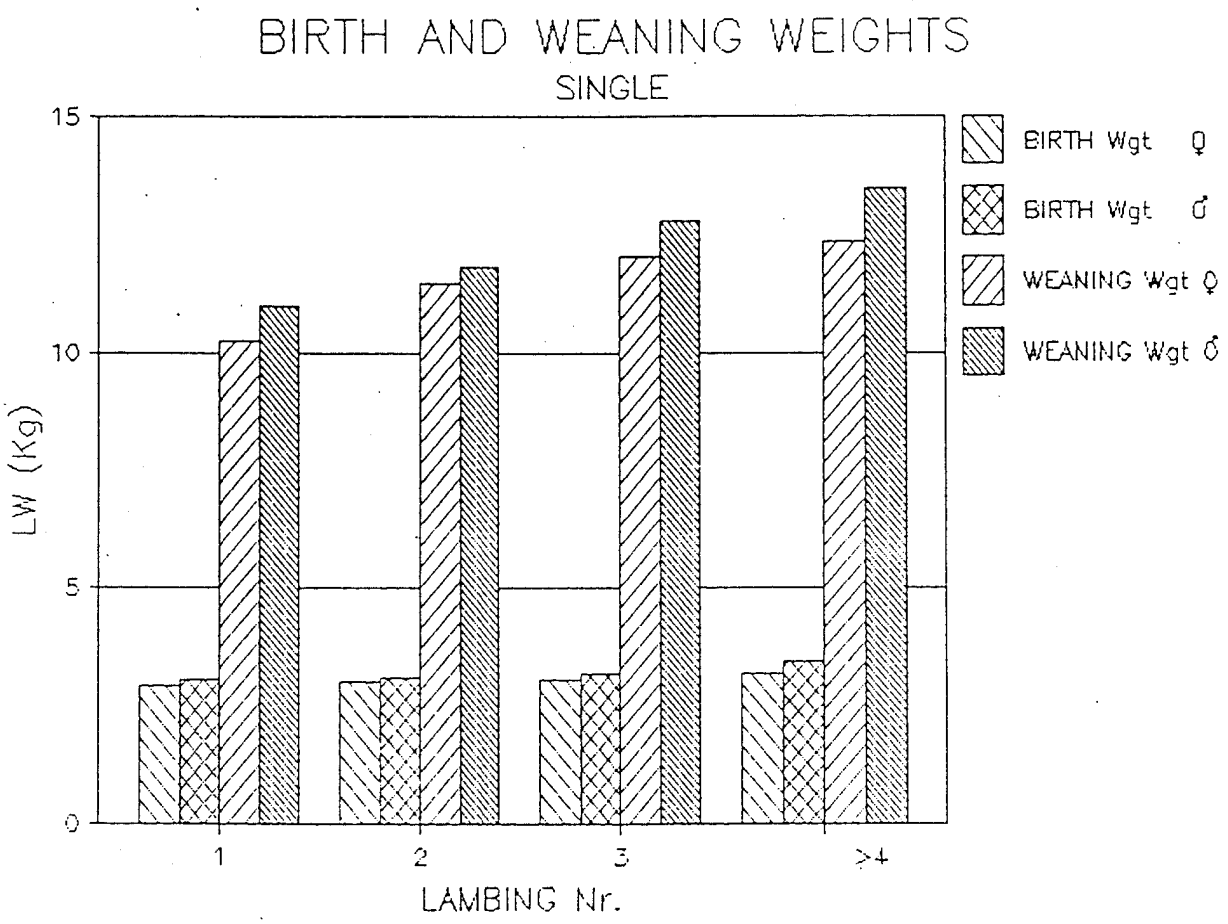


Fig. 14

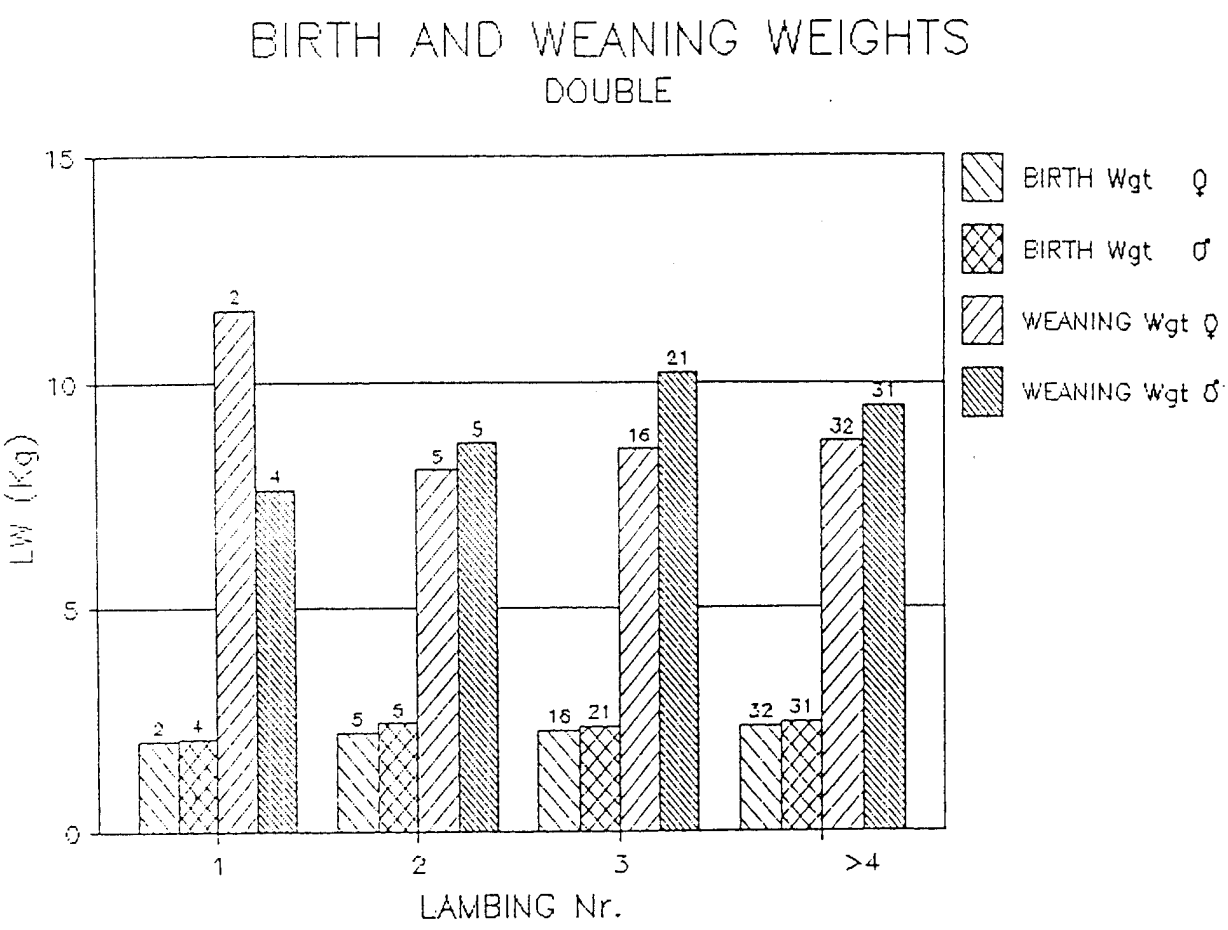

BIRTH AND WEANING WEIGHTS
DOUBLE
BIRTH Wgt ♀
BIRTH Wgt ♂
WEANING Wgt ♀
WEANING Wgt ♂
LW (Kg)
15
10
5
0
2
4
2
4
5
5
5
5
16
21
16
21
32
31
32
31
1
2
3
>4
LAMBING Nr.

Fig. 15

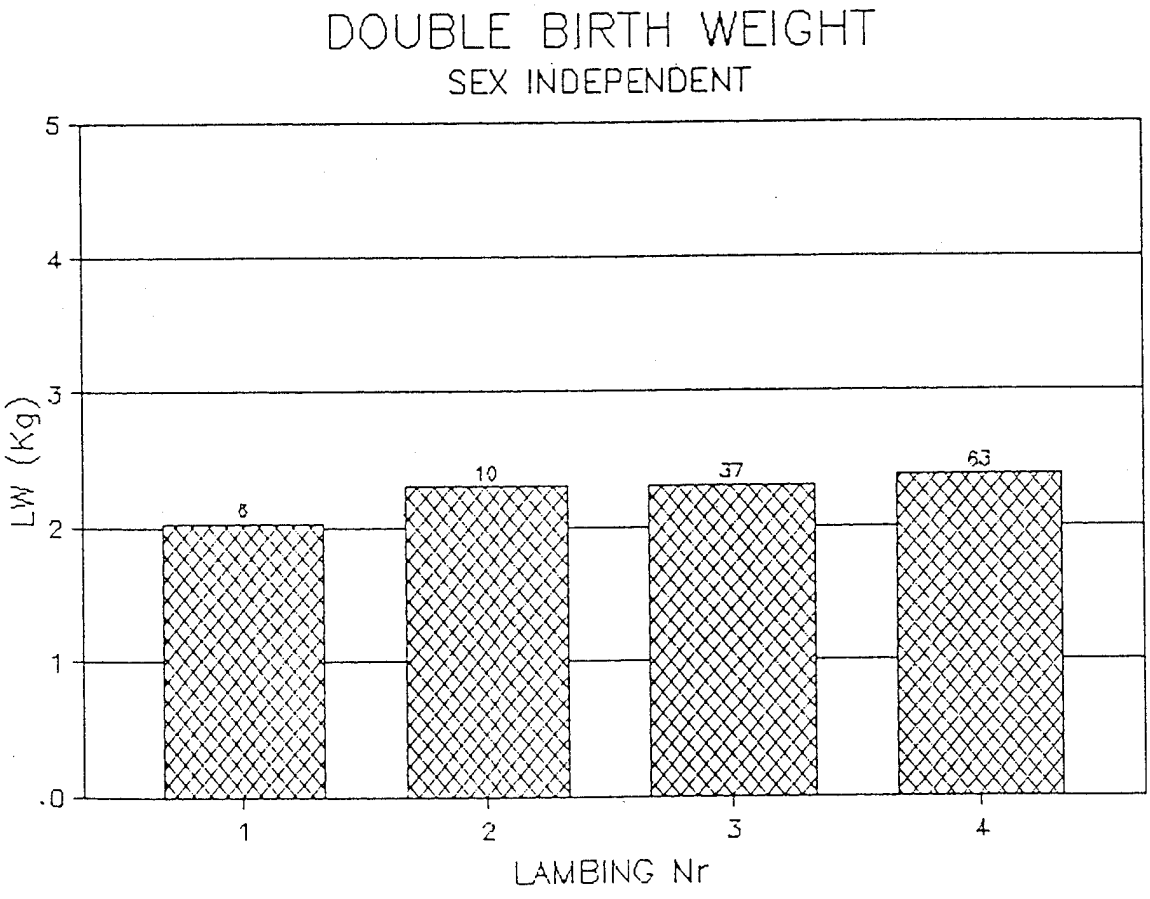

DOUBLE BIRTH WEIGHT
SEX INDEPENDENT
LW (Kg)
5
4
3
2
1
.0
8
10
37
63
1
2
3
4
LAMBING Nr

Fig. 16

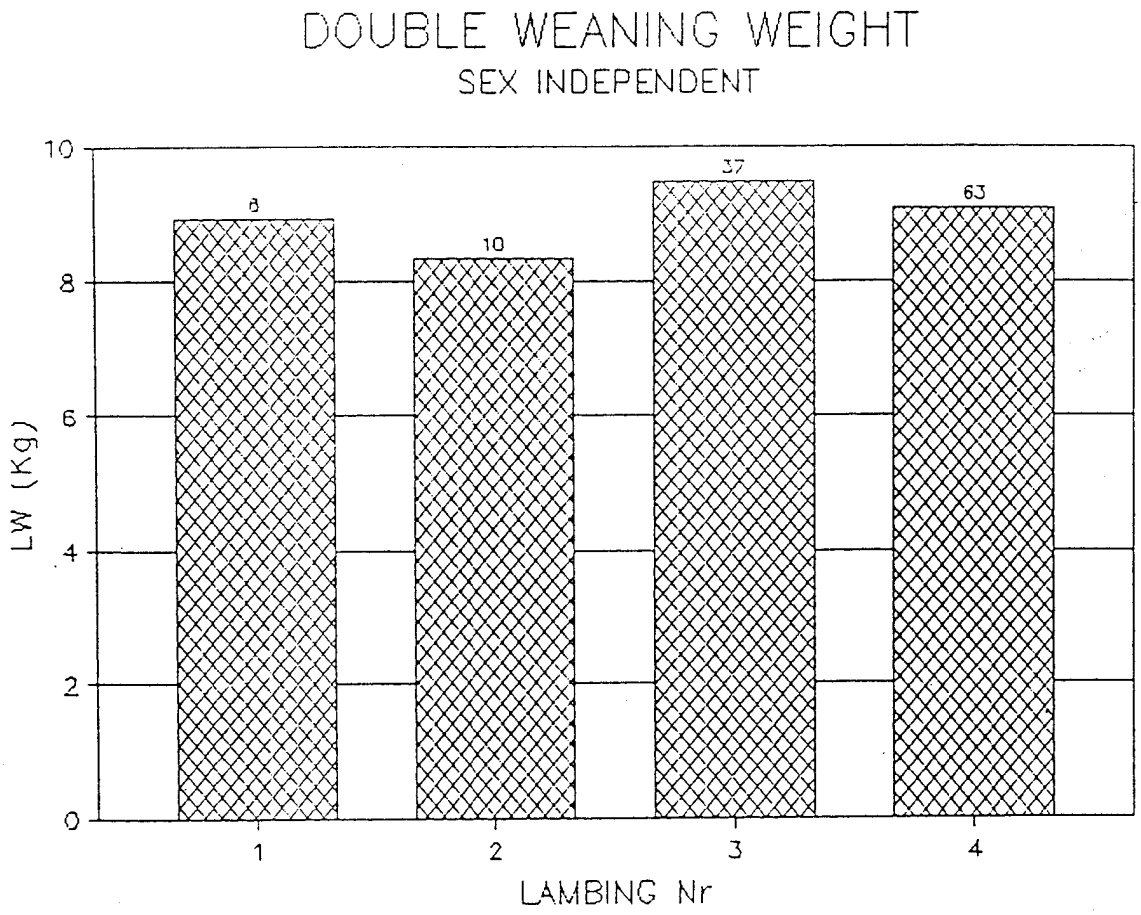

DOUBLE WEANING WEIGHT
SEX INDEPENDENT
LW (Kg)
10
8
6
4
2
0
8
10
37
63
1
2
3
4
LAMBING Nr

Fig. 17

DAILY LIVEWEIGHT GAIN OF SINGLE BIRTH LAMBS FROM 10-30 DAYS AND 30-70 DAYS

SEX	10-30 (gr)	Nr	(gr) 30-70	Nr
MALES ♂	170 ± 59	384	140 ± 51	363
FEMALES ♀	162 ± 50	85	145 ± 49	85

The female lamb growth in terms of lambing number was not significant due probably to our having only handled information on replacement female lambs. Because of this, liner regression (0-70 days) of females daily liveweight gains is not included.

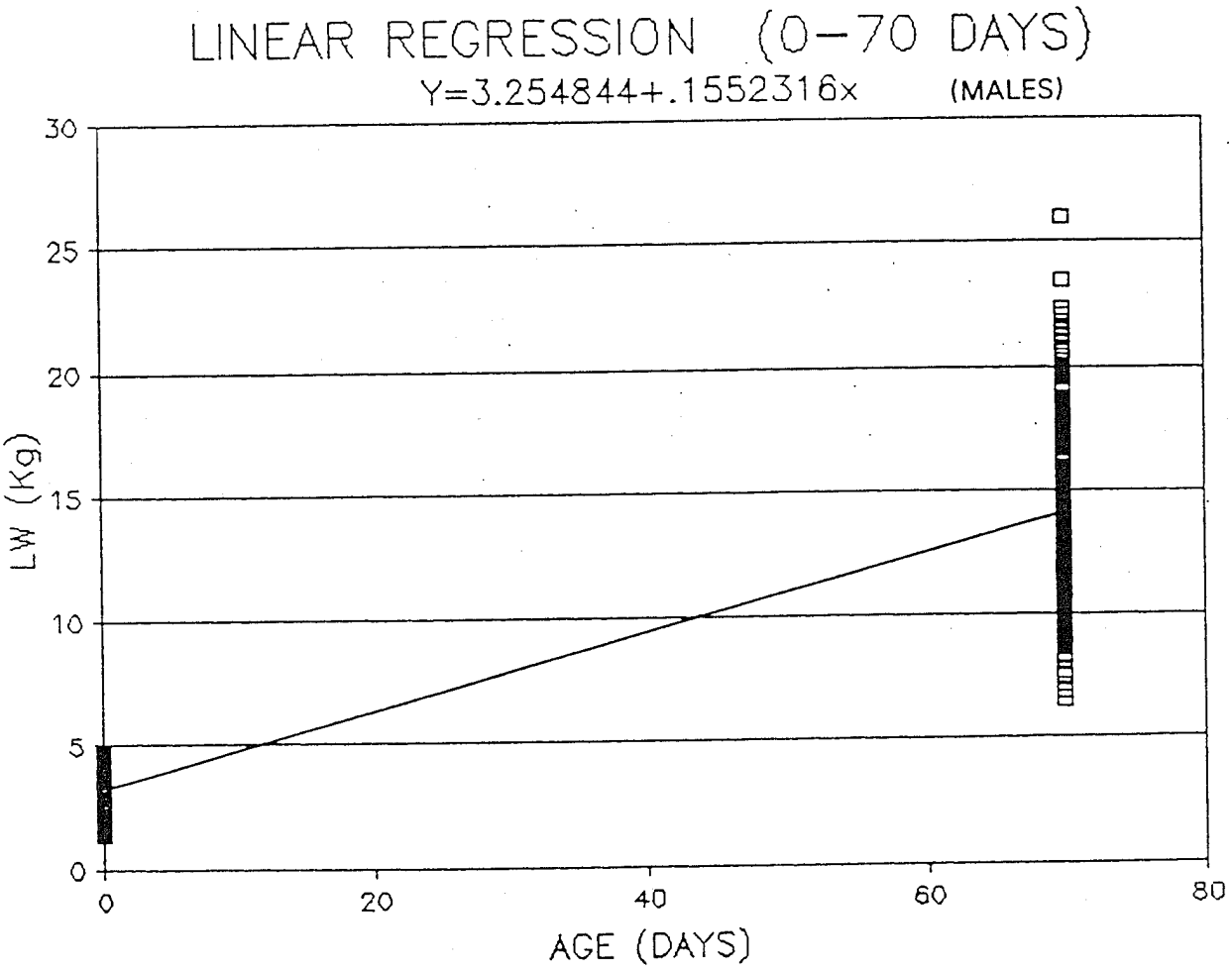


Fig. 18

MILK PRODUCTION

The lambing season (Winter/Spring and Autumn/Winter) effect on the milk production was significant for $P < 0,05$.

Normalized and corrected production (0-150 Days) is presented in figures 19-20.

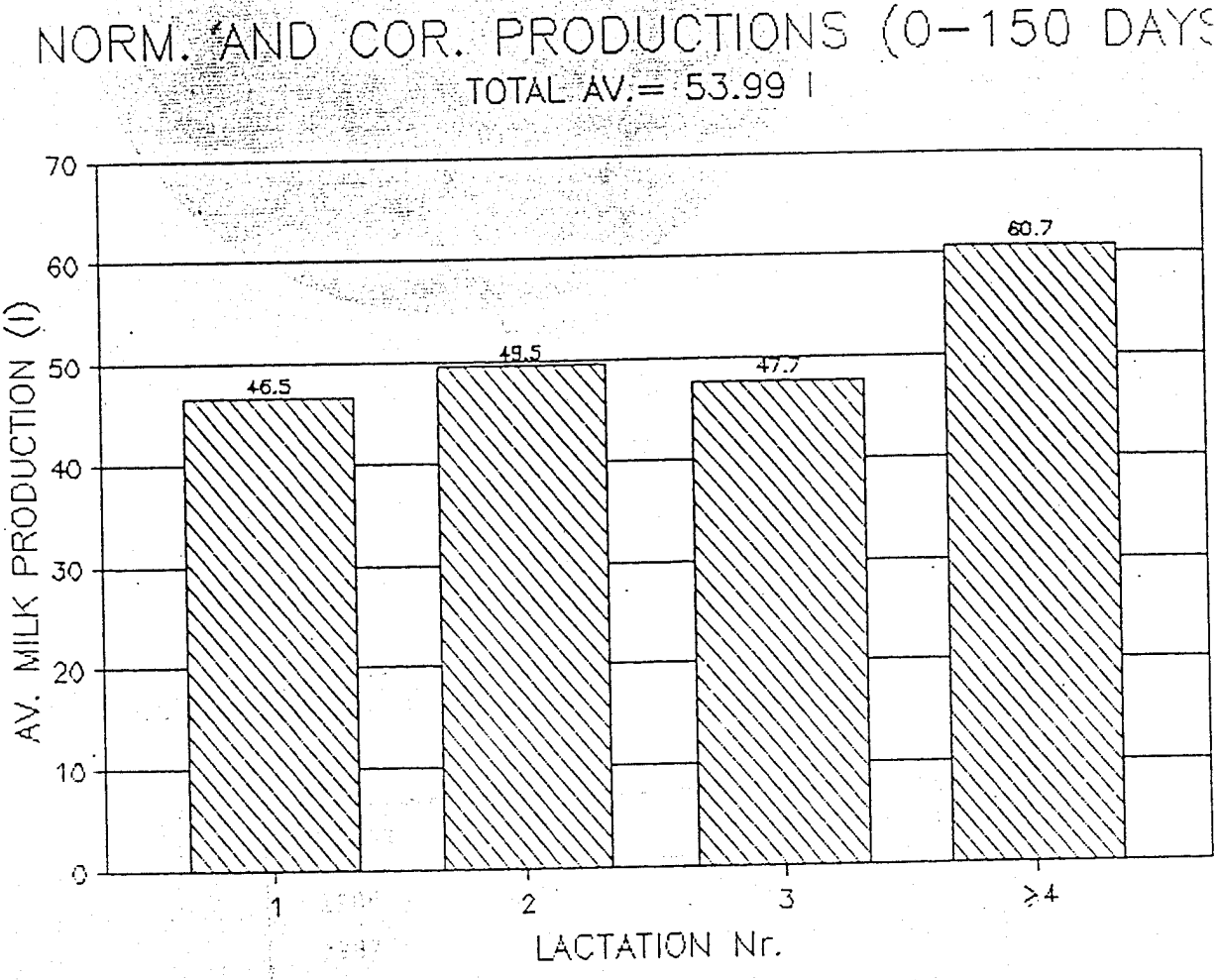


Fig. 19

DAILY LIVEWEIGHT GAIN OF SINGLE BIRTH LAMBS FROM 10-30 DAYS AND 30-70 DAYS

SEX	10-30 (gr)	Nr	(gr) 30-70	Nr
MALES ♂	170 ± 59	384	140 ± 51	363
FEMALES ♀	162 ± 50	85	145 ± 49	85

The female lamb growth in terms of lambing number was not significant due probably to our having only handled information on replacement female lambs. Because of this, liner regression (0-70 days) of females daily liveweight gains is not included.

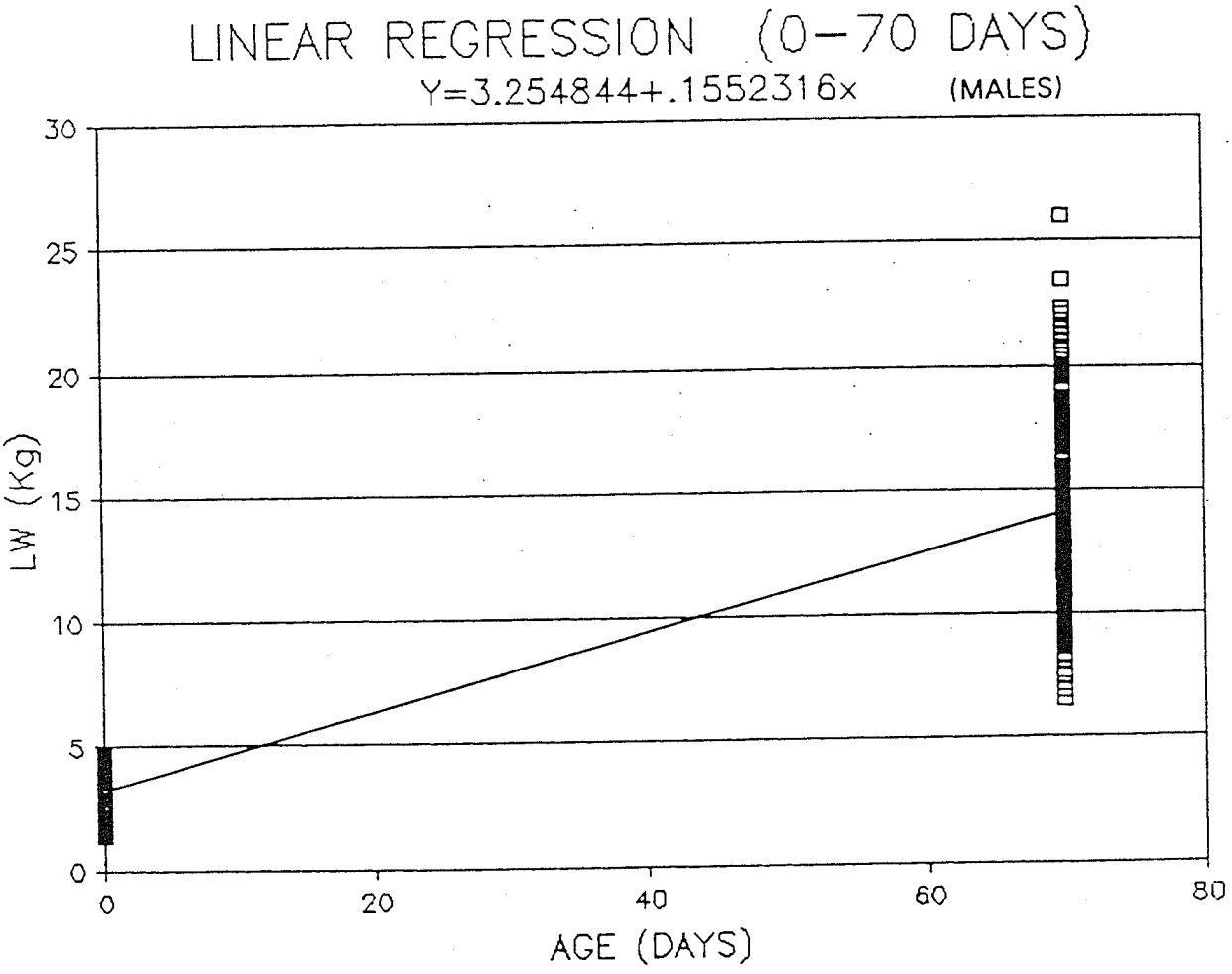


Fig. 18

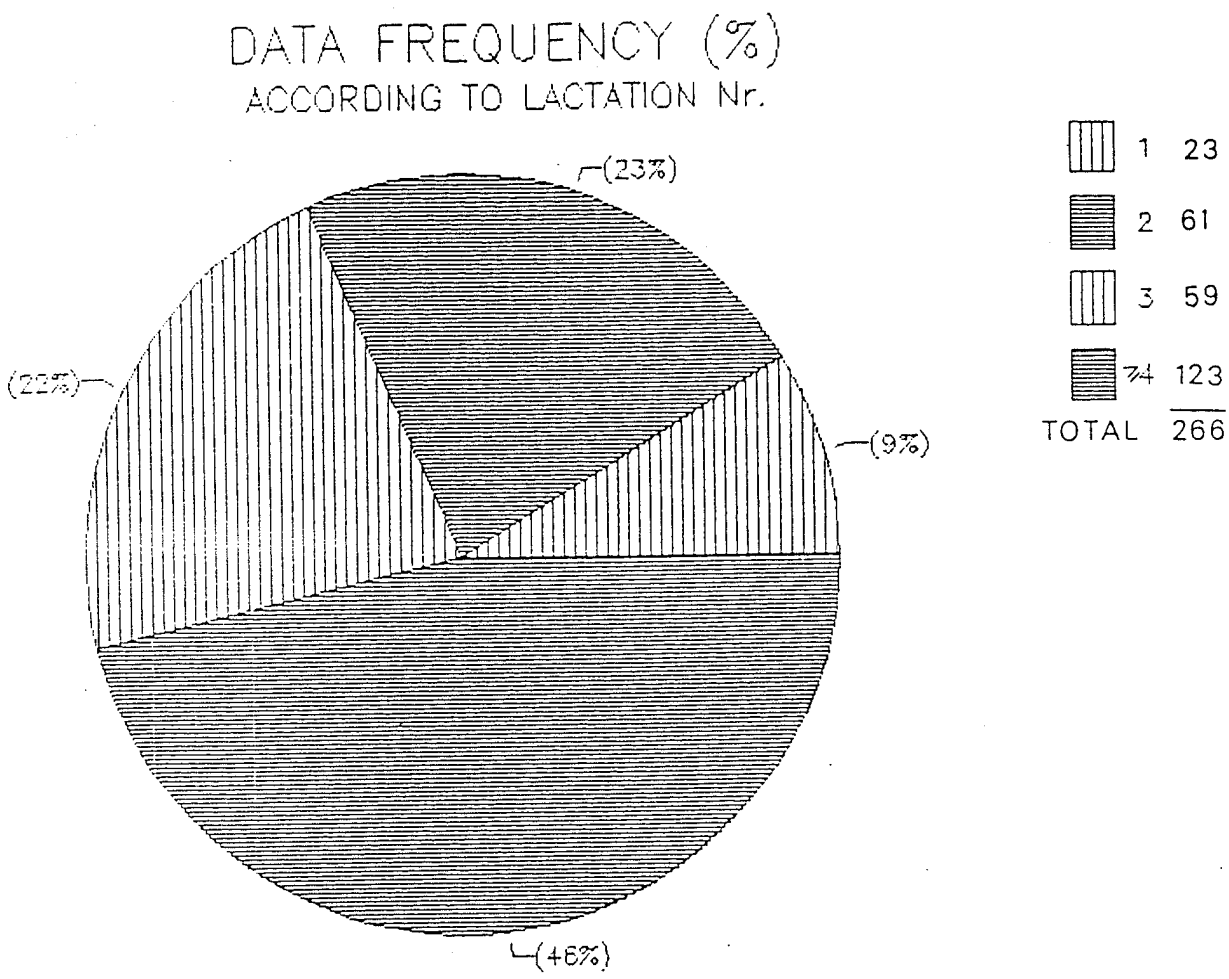


Fig. 20

GREASY WOOL PRODUCTION

YEARS	$\bar{X}$	σ	NR OF EWES
1986 *	2,98	± 0,52	227
1987 +	2,05	± 0,35	247
AVERAGE	2,49	± 0,63	474

* Wool growth during 15 months

\+ Wool growth during 9 months

CARCASS CLASSIFICATION

In collaboration with the EZN (National Zootechnic Station) - - Fonte Boa we developed a intensive rearing programme of cross-bred (♂ and ♀) and pure-bred lambs (♂) in order to determine the ideal slaughter weight.

This was found to be 30 Kg and 25 Kg for cross-bred males and pure-bred BBM respectively and 25 Kg por cross-bred females.

The carcass classification grid used was the EZN one.

Table A

% OF THE TOTAL FAT	A	B	C 25 Kg	C 28 Kg
% SUB. FAT	43.63	42.42	39.93	43.28
% INT. FAT	46.18	46.90	44.48	42.74
% KKCF	9.99	9.48	15.10	14.01
SUB./INT.FAT	0.95	0.94	0.90	1.02
SUB.FAT/KKCF	4.45	4.99	2.61	3.14
MUS./BONE	3.05	3.14	3.19	3.29
MUS./TOTAL FAT	1.92	1.84	1.65	1.49

JANELA (1985)

Note: A - ♂ B.B.M.
B - ♂ F1 (M.P.x B.B.M.)
C - ♀ F1 (M.P.x B.B.M.)
C - ♀ F1 (M.P.x B.B.M.)

Table 8

% SUBCUTANEOUS FAT

CONFORMATION	8%	8.1-10.9 %	11-13.9 %	14-16.9 %
	1	2	3	4
E			. xxxxxx - ++++	--- ++
Z		... -	..... xxxx ---	xx +
N		.	.....	

JANELA(1985)

Note: . - ♂ B.B.M.....slaughter - 25 Kg L.W.
x - ♂ F1 (M.P.xB.B.M.).....slaughter - 30 Kg L.W.
- - ♀ F1 (M.P.xB.B.M.).....slaughter - 25 Kg L.W.
+ - ♀ F1 (M.P.xB.B.M.).....slaughter - 28 Kg L.W.

3. GENETIC PARAMETERS

Fenotipical data of the normalized and corrected milk production were used, the results being the following:

Number of data = 76

h^2 = 0,1026

σ = 0,10395

The heritability value is lower than the results obtained by other authours (Dassat and mason, 1952; Horak, 1969; Romer et al, 1971) working on similar breeds . However, due to the small number of used data, the heritability value estimate does not have an admissible accuracy.

CONCLUSIONS

The values obtained for milk production and greasy wool production are similar to those reached by Sobral, 1968. As to the lambs weights at birth and weaning time and as to the liveweight gain from 10-30 and 30-70 days we do not know any other work which we could use as comparison.

In what concerns the weight of adult sheep, Pinto de Andrade et al (1987) have estimated 39 Kg, wich we think meets reality better than the weight mentionned by Sobral (1986): 28-30 Kg.

The study of carcasses to determine the ideal slaughter weight was done by intensive rearing based on concentrate ad libitum from 2 months of age onwards and we are planing on developing this study using intensive rearing programme based on grazing.

RESUMÉ

On a récolté, ordoné et structuré un ensemble de données de l'élévage ovin Merino de Beira Baixa à l'Escola Superior Agrária de Castelo Branco (Portugal) obtenus parmis 1981 et 1987.

L'âge moyènne à la première parturition en fonction du type de naissance des femmelles (simples ou jumellères) a été respectivement de 600,10 ± 158,86 jours et 583,90 ± 159,78 jours et les différences verifiées n'etaient pas significatives. Toutefois, ce paramètre s'a revélé influencé par l' "année" ($P < 0,01$). L' intervalle parmis les parturitions révéle qu'il ne depend pas des mois de parturitions dans les époques, mais parmis les deux époques de parturitions (de Janvier à Mars - 296,4 ± 64,22 jours et de Septembre à Novembre - 380, 0 ± 71,56 jours). L'intervalle parmis les parturitions a presenté aussi des différences significatives ($P < 0,01$) pour l'âge à la parturition. La taxe moyènne de fertilité apparent a été de 86,6%, la prolificité moyénne de 114,2% et la productivité numérique a été de 92,7%. Tous ces indices se montrent dependents de l'âge de la brebis au moment de la parturition. On a calculé aussi d'autres paramètres reproductives qui on été analysés.

Le poids moyen à la naissance et au sevrage (60 jours d'âge) a été de 3,34 ± 0,56 Kg et 12,80 ± 2,44 Kg pour les mâles simples, 3,02±0,51 et 11,45 ± 2,01 Kg pour les femelles simples. Les différences verifiées on été significatives (pour les femelles autant que pour les mâles) en conformité avec le numéro de parturitions des brebis ($P < 0,01$ et $P < 0,05$). Pour les parturitions jumellères, le poids moyen à la naissance et au sevrage a été respectivement de 2,39 ± 0,45 Kg et 9,77 ± 1,82 Kg pour les mâles et 2,31 ± 0,48 Kg et 8,63 ± 2,89 Kg pour les femelles. La croissance parmis les 10 - 30 et 30 - 70 jours d' âge des femelles simples a été de 162 ± 50 gr et 145 ± 49 gr respectivement et pour les males a été de 170 ± 59 gr et 140 ± 51 gr respectivement. La production moyenne du lait (0 - 150 jours de lactation) a été de 46,3 litres. La production moyenne de laine par animal a été de 2,49 ± 0,63 Kg.

On a determiné des paramètres phenotypiques. L' heritabilité pour la production laitière (2b) a été $h^2 = 0,1026$; comme on peut conclure de l' écart type de la détermination (0,1039), le numéro de données ne permet pas encore faire un calcul précis de ce paramètre.

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 1987.

A idade média ao primeiro parto em função do tipo de nascimento das fêmeas (simples ou gemelares) foi respectivamente de 600,10 ± 158,86 dias e de 583,90 ± 159,78 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 pariações dentro de épocas mas sim entre as duas épocas de partos (Janeiro a Março - 296,4±64,22 dias e Setembro a Novembro - 380,0 ± 71,56 dias).

O intervalo entre partos apresentou ainda diferenças significativas ($P < 0,01$) para a idade ao parto. A taxa média da fertilidade aparente foi de 86,6%, a prolificidade média foi de 114,2%, a productividade numérica média foi de 92,7%. Todos estes índices mostraram-se dependentes da idade da ovelha ao parto. Foram ainda calculados outros parâmetros reprodutivos, sendo incluida a sua análise.

O peso médio à nascença e desmame (60 dias de idade), foi de 3,34 ± 0,56 Kg e 12,80 ± 2,44 Kg para os machos simples e de 3,02 ± 0,51 Kg e 11,45 ± 2,01 Kg para as fêmeas simples, sendo significativas as diferenças verificadas (tanto para as fêmeas como para os machos) consoante o número do parto das ovelhas ($P < 0,01$ e $P < 0,05$). Para partos gemelares o peso médio à nascença e desmame foi respectivamente de 2,39 ± 0,45 Kg e 9,77 ± 1,82 Kg para machos e de 2,31 ± 0,48 Kg e 8,63 ± 2,89 Kg para fêmeas. O crescimento entre os 10 - 30 e entre os 30 - 70 dias de idade, das fêmeas simples, foi de 162 ± 50 gr e de 145 ± 49 gr respectivamente e para os machos foi de 170 ± 59 gr e 140 ± 51 gr respectivamente. A produção média de leite (0 - 150 dias de lactação) foi de 46,3 litros. A produção média de lã, por animal,foi de 2,49 ± 0,63 Kg.

Determinaram-se parâmetros fenotípicos. A heritabilidade para a produção leiteira (2b) foi de $h^2 = 0,1026$; Como se pode observar pelo desvio - padrão da determinação (0,1309) o número de dados não permite ainda um cálculo preciso deste parâmetro.

ACKNOWLEDGMENTS

Our thanks to Drª MARIA MARGARIDA AFONSO PASSOS MORGADO, for the English translation and Drª MARIA EDUARDA S.M.P. NOGUEIRA RODRIGUES, for the French translation. And also to Engº Téc.Agr. RUI TOMÁS MONTEIRO and Foto-montador, MANUEL MARQUES SALVADO DOS SANTOS, for the printing and graphic arrangements.

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