STUDIES REGARDING PRODUCTIVE LIFE
OF A FRIESIAN COW POPULATION

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Abstract

The purpose of this research was to find some methods to grow up the productive life of cows for a good profitability in the farm. The research was had been conducted on 125 Friesian cows. The results show an average milk production of 4580.70 kg in the first lactation along 305 days, reaching maximum value (5694.84 kg) in the third lactation. The first lactation is 80.43% from the maximum lactation. Is to note the big variability of milk production which is situated between 18 and 22 %. The productive life was of 824.85 days for the cows which finished the production period and the life span of cows was up to 1769.52 days. The cows from this population were milked in average by 2.96 lactation and they were kept in population for about 4.85 years. The average milk production per productive life was 13266.14 kg with 518.42 kg pure fat and 359.90 kg protein and using index was 46.61%.

Key words: Friesian, milk, life span, productive life

INTRODUCTION

Within the productive longevity as a whole, we may distinguish two consecrated terms, namely biological longevity and productive longevity. Practically they both are in an interdependence relation each having its economic importance depending on the level of melioration of breeds, the exploitation direction, the health state and the environment conditions.

Biological longevity is defined as the length of life between the moment of birth and the date of death from natural cases and productive longevity is defined as the period between the date of first calving, followed by lactation up to the end of the productive life registered in the last lactation. Productive longevity (Pantazi D. [6], Maciuc V. [5]) is the parameter measured in terms of number of lactations or productivity years. The longer the productive longevity, the bigger the milk production but, in order to be real, the profitability of productive longevity must be in an optimal ratio with the level of milk production. A good longevity does not necessarily mean a good profitability if by the obtained production they do not pay off expenses and they do not obtain a benefit from cows' exploitation. In this context, we wanted to study the productive longevity for a Friesian population exploited on a developing farm from eastern Romania.

MATERIAL AND METHOD

The studied biological material is represented by about 122 cows of the Friesian type, exploited in semi-intensive system at the farm S.A. Agroind Berezeni, Vaslui County, which is right now in full modernization. We analysed several aspects for this population: indices of milk production by 5 lactations, the reproduction indices, the average values and longevity variability, the use index and the productive longevity.

The data came from observations and direct determinations on the farm and from the primary data bank of the farm and O.A.R.Z. Vaslui (Office for Improvement and Reproduction in Animal Science, Vaslui). Once systematized, the data were analysed and interpreted by methods specific to such researches − arithmetic average, average error, standard deviation, variability coefficient, etc., using the statistics programme, variance and covariance analysis (S.A.V.C.) elaborated by V. Maciuc in 2002-

2003 at U.S.A.M.V. Iasi, Romania (Maciuc V. et al. [4]).

The complexity of the studied aspects imposed the use of a diversified work methodology depending on the aspects under study using and complying with the investigation methodology specific to the researches from animal science recommended by the specialized literature (B. Albarrán-Portillo et al. [1], Ducroq, V. [3]).

RESULTS AND DISCUSSIONS

The cows' exploitation is made depending on each season, in winter bound in the shelter and in summer in summer camps. The bound maintenance by two row arrangement (Maciuc V. [5]) and the head to head arrangement (fig. 1) is a widely spread variant since the interior arrangement of shelters contains functional areas and is adequate to this system. The capacity of a shelter is up to 125 cows. To allow the access of equipment, the central lane is 2.5 m wide and communicates with the 3/3 m frontal doors. The service lanes are 0.70 m wide. The evacuation of dejections is made by water pillow. The shelter is provided with 22 windows giving it a high luminosity. The cows are bound by vertical system of Grabner type, with individual binding and group unbinding. The tight binding prevents the cows from putting their feet into the trough since their movement forward, backward and sideways is limited. The cows' milking is mechanized with a centralized transport of milk.

Fig. 1 Aspects from inside the shelter

The average production performances for the population under study (tab. 2 and fig. 2), for the first five normal lactations, were 4580.70 kg of milk in the 1st lactation and 5265.33 Kg of milk in the 5th lactation. Once the lactations succeed each other, the production level increases up to the 3rd lactation when it reaches a maximum value of 5694.84 kg of milk, 226.62 kg of pure fat and 194.87 kg of pure protein. The 1st lactation represents 80.43 % from the maximum lactation. Regarded as a whole, the population is heterogeneous with variability between 18 and 22% (V. Tančin et al. [7]) for this character.

The milk quality gives the possibility to a producer to produce a wide range of products but also products' and buyer's hygiene. Speaking about the milk quality, we must take into account its physical-chemical and organoleptic features as well as a series of indicators such as: the bacterial and biological level (the number of bacteria and the number of somatic cells) and the inhibiting substances (impurities, disinfectants, antibiotics etc.). Sometimes the fat and protein content adds to these components. Consequently, quality milk may be obtained by taking into consideration each of the components already mentioned.

The fat content of milk has values between 3.86 – 4.02 % with plus variants exceeding the value of 4.94 %. At the same time, the protein content of milk registered values between 3.21 – 3.30 %.

Table 2
Average and estimate values of variability of production features by successive lactations for the Friesian population from Berezeni farm, Vaslui County

| Lact.	Statistics	Total lactation					Normal lactation				
		Milk kg	% fat	Kg fat	% prot.	Kg. prot.	Milk kg	% fat	Kg fat	% prot.	Kg. prot.
1st Lact.	n	122	122	122	122	122	122	122	122	122	122
	$\overline{X}$	5453.39	3.84	209.12	3.23	177.71	4580.70	3.86	176.71	3.21	153.29
	$\pm s_{\overline{x}}$	139.685	0.026	5.397	0.025	5.147	75.509	0.029	2.896	0.017	2.585
	s	1242.87	0.28	59.61	0.25	50.70	834.02	0.32	31.98	0.17	25.46
	V%	28.29	7.37	28.50	7.63	28.53	18.21	8.31	18.10	5.14	16.61
	Min	2794.00	3.31	109.00	2.87	86.83	2794.00	3.24	109.00	2.87	86.83
	Max	13567.00	4.70	551.21	5.03	488.39	7391.00	4.97	318.10	3.76	239.90
2nd Lact.	n	69	69	69	69	69	69	69	69	69	69
	$\overline{X}$	5800.87	3.96	228.90	3.27	192.53	5038.78	3.95	198.69	3.27	173.47
	$\pm s_{\overline{x}}$	165.103	0.033	6.574	0.022	5.175	123.341	0.035	4.963	0.022	4.012
	s	1171.45	0.27	54.60	0.16	38.03	1024.55	0.29	41.22	0.16	29.48
	V%	23.64	6.91	23.86	4.90	19.75	20.33	7.37	20.75	4.86	17.00
	Min	3053.00	3.57	125.00	2.98	115.00	3053.00	3.57	125.00	2.99	115.00
	Max	10270.00	4.70	418.34	3.60	298.50	8346.00	4.70	344.70	3.60	281.70
3rd Lact.	n	45	45	45	45	45	45	45	45	45	45
	$\overline{X}$	6559.71	4.00	263.85	3.30	223.21	5694.84	4.02	226.62	3.30	194.87
	$\pm s_{\overline{x}}$	233.237	0.044	10.514	0.025	8.455	175.217	0.050	8.565	0.026	6.040
	s	1364.60	0.29	70.53	0.16	52.80	1075.39	0.33	57.46	0.16	37.72
	V%	23.85	7.36	26.73	4.74	23.66	20.64	8.29	25.35	4.85	19.36
	Min	3346.00	3.50	128.88	2.96	137.00	3346.00	3.46	128.88	2.96	137.00
	Max	9807.00	4.65	418.90	3.67	327.50	8682.00	4.94	358.70	3.67	300.80
4th Lact.	n	30	30	30	30	30	30	30	30	30	30
	$\overline{X}$	6233.80	3.95	245.65	3.21	198.87	5375.87	3.93	209.52	3.21	177.97
	$\pm s_{\overline{x}}$	295.038	0.056	13.908	0.027	9.223	222.405	0.064	10.499	0.027	8.314
	s	1315.99	0.30	76.18	0.14	47.03	1018.16	0.35	57.50	0.14	42.39
	V%	25.92	7.71	31.01	4.33	23.65	22.66	8.89	27.45	4.29	23.82
	Min	3276.00	3.50	107.00	2.97	104.30	3276.00	3.22	107.00	2.97	104.30
	Max	10746.00	4.55	477.44	3.42	320.40	7722.00	4.55	325.70	3.42	261.60
5th Lact.	n	12	12	12	12	12	12	12	12	12	12
	$\overline{X}$	5891.25	3.89	224.79	3.22	188.56	5265.33	3.77	202.92	3.20	169.81
	$\pm s_{\overline{x}}$	471.945	0.076	16.176	0.062	14.336	265.149	0.057	9.612	0.046	8.464
	s	1304.86	0.23	56.04	0.22	49.66	918.50	0.20	33.30	0.16	29.32
	V%	27.75	5.83	24.93	6.72	26.34	17.44	5.24	16.41	4.94	17.27
	Min	3317.00	3.66	136.00	3.00	123.00	3317.00	3.28	136.00	3.00	123.00
	Max	10145.00	4.41	361.80	3.71	320.30	7149.00	4.00	264.70	3.55	233.30
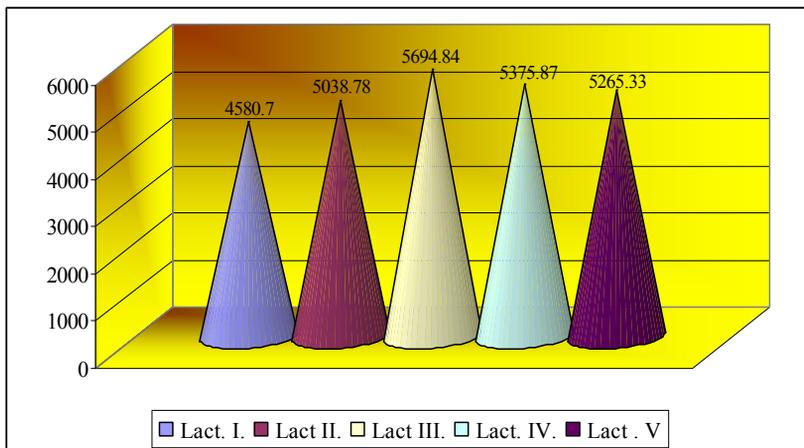
Fig. 2 Graphic representation of the milk quantity for normal lactation

The study of the reproduction indices (tab. 3 and fig. 3) underlines the following aspects: the age at first calving was 944.66 ± 6.70 days (31 months) quite tardy for the breed under study, the calving interval ranged between 441.73 and 496.33 days, exceeding the optimal limit for all lactations; the same aspects were highlighted for the service period of 137.9 – 155.07 days and the mammary repose had values between 67-83 days. We must mention that to a higher value of the calving interval indicator corresponds a longer service period and mammary repose (fig. 3).

Table 3
Average and estimate values of variability of reproduction features by successive lactations for the Friesian population from Agroind Berezeni farm, Vaslui County

| Statistics		n	$\overline{X}$	±s$_{\overline{x}}$	s	V%	Min	Max
Age at first calving, days		122	944.66	10.632	117.33	12.42	741.00	1230.00
CI days	I-II	69	471.06	11.409	94.77	20.12	302.00	676.00
	II-III	45	473.18	14.719	98.74	20.87	335.00	686.00
	III-IV	30	441.73	16.491	90.33	20.45	317.00	656.00
	IV-V	12	496.33	18.704	64.79	13.06	337.00	559.00
MR days	II	69	67.13	2.531	21.02	31.31	26.00	122.00
	III	45	67.76	2.842	19.06	28.14	36.00	142.00
	IV	30	74.63	4.057	22.22	29.78	59.00	132.00
	V	12	83.75	10.926	37.85	45.19	43.00	136.00
SP days	II	69	155.07	5.792	48.11	31.03	52.00	223.00
	III	45	159.36	7.668	51.44	32.28	62.00	219.00
	IV	30	137.90	9.760	53.46	38.77	62.00	215.00
	V	12	149.08	11.547	40.00	26.83	76.00	200.00
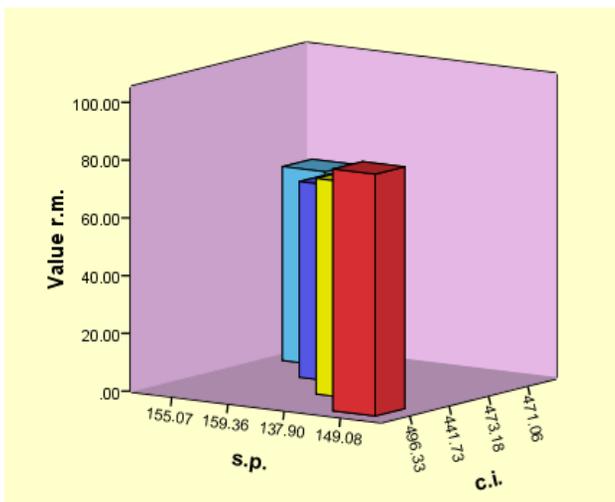
Fig. 3 Three-dimensional representation of the reproduction indices

The results on longevity for the population under study (Ducroq, V [3], Pantazi D. [6]) are given in table 4. The data show that the length of the productive life for the 122 cows that ended their production period on the farm was 824.85 days, with limits between 280 and 2392 days and a very strong variability (V%=65,04%). The cows from this population were exploited on average for 2.96 normal lactations (305 days), without expressing their maximal production potential throughout life and the coming out of livestock occurred too early. Despite all these, we may say this is a reasonable longevity as compared to other populations of the Friesian type.

Table 4
Average values and variability of longevity for the population of Dutch Friesian from Agroind Berezeni farm, Vaslui County

Specification		n	∑x	$\overline{X}$	$\pm s\,\overline{x}$	s	V%	Limits	
								Min.	Max.
DVP days		122	100632.00	824.85	48.570	536.47	65.04	280.00	2392.00
DVT days		122	215881.00	1769.52	46.696	515.77	29.15	1120.00	3382.00
Milk (Kg)		122	1618469.00	13266.14	793.108	8760.17	66.03	3672.00	36662.00
Fat (Kg)		122	63247.35	518.42	32.259	356.31	68.73	130.16	1438.43
Protein (Kg)		122	43548.30	359.90	21.894	240.84	66.92	114.45	1097.40
Accrues per day of productive life	Milk (Kg)	122	-	16.08	-	-	-	-	-
	Fat (Kg)	122	-	0.62	-	-	-	-	-
	Protein (Kg)	122	-	0.43	-	-	-	-	-
Accrues per day of life	Milk (Kg)	122	-	7.49	-	-	-	-	-
	Fat (Kg)	122	-	0.29	-	-	-	-	-
	Protein (Kg)	122	-	0.20	-	-	-	-	-
Use index %		122	-	46.61	-	-	-	-	-

The lifespan was 1769.52 days with limits between 1120 and 3382 days. It results that the cows were maintained in population, on average, for 4.85 years, with limits between 3.07 and 9.27 years. The variability of lifespan was extremely strong being highly influenced by the technological factors,

feeding and farm management (G. L. Hadley et al. [2]).

The average milk production per productive life was 13266.14 kg, 518.42 kg of pure fat and 359.90 kg of pure protein, with a high variability of more than 66%.

Taking into account the exploitation time and the total mil production, it results that to the population under study accrues 16.08 kg f

milk, 0.62 kg of pure fat and 0.43 kg of pure protein per day of productive life and 7.49 kg of milk, 0.29 kg of pure fat and 0.20 kg of pure protein per day of life.

The use index was 46.61, a weak value that might be improved by the application of some hi-tech technologies for the continuous improvement of the population.

Table 5
Productive longevity for the population of members of the Bovidae family of Friesian type from Agroind Berezeni farm, Vaslui Coutnty, analysed through "Survival Analysis'' method

Specification	Percentages of survival after lactation:									
	I		II		III		IV		V	
	n	%	n	%	n	%	n	%	n	%
Total population	122	100	69	56.55	45	36.88	30	24.59	12	9.83

The data obtained through Survival Analysis method and presented in table 5 highlight the fact that in the first lactation the livestock has a share of 100 %, in the second lactation it reaches 56.55 %, in the third lactation 36.88 % and in the fifth lactation 9.83% from the initial livestock.

CONCLUSIONS

1. The 1st lactation represents 80.43 % from the maximum lactation highlighting a good productive level with improvement possibilities by selection and use of valuable reproducers.

2. The use index of population of 46.61 % may be improved by the application of some hi-tech technologies for the continuous improvement of the population.

3. The increase of the genetic potential and productivity, concomitantly with the optimization of technologies, management and a correct economic administration are important ways to enhance the profitable production.

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