THE EFFECT OF SOME ENVIRONMENTAL FACTORS ON MONTHLY MILK YIELD OF BUFFALOES, NATIVE COWS AND FRIESIANS IN EGYPT

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SUMMARY

A statistical study was carried out using the records of buffaloes and native cows of the herd belonging to the Animal Breeding Department, Faculty of Agriculture, Cairo University, and the Friesian herd of the Animal Production Department, Thereer Province. The data comprise 681 animals, having 1244 lactaitons, recorded during a period of 24 years for buffaloes, 18 years for native cows and 4 years for Friesians. The aim of this work was to study the effect of some nongenetic factors on monthly milk yield as well as the 305 days milk production. The repeatability of monthly milk yield was also investigated. The main results obtained are summarised as follows :

(1) The mean age at first calving was found to be 37, 34, 30 months for the buffaloes, native cows and Friesinans respectively. Age at first calving had no effect on monthly milk yield in native cows. In buffaloes, age of first calving affects significantly the yield of the sixth, seventh, and eighth months of the lactation. Studying the influence of this factor on monthly milk production of the Friesians it showed a significant effect at the third, fourth, month and the period from the seventh to the tenth month of lactation. The regression coefficient of total milk yield on age at first calving is significant in the Friesians and not significant in both buffaloes and native cows.

(2) Buffaloes, native cows and Friesians reached their peak of production at the fourth, third and fifth lactation when they were 89, 62, 82 months of age respectively. It was found that age had significant effect on the first seven months of the lactation for the three herds studied.

(3) Animals calving in the months between September and February were the best yielders. Month of calving had a significant effect on all monthly milk yield in the Friesians but in case of buffaloes only the first eight months were affected. In native cows the yeild of the first, second, ninth, tenth months of the lactation were affected by month of calving.

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(4) The average preceding dry period for buffaloes, native cows, and Friesians were found to be 147, 127, 95 days respectively. The preceding dry period showed no effect on monthly milk yiedld in buffaloes while it has a significant effect on yield of the first three months of the lactation in the native cows and on the whole lactation in Friesians. The regression coefficient of dry period on milk yield was not significant in the buffaloes and native cows, while it was significant in the Friesians.

(5) The average service periods was found to be 114.3, 98.9 and 144.5 days for the buffaloes, native cows and Friesians respectively. The service period had no effect on monthly milk yield in native cows, while buffaloes showed significant influence at the period from the fifth to the ninth months of lactation. A significant effect was noticed on monthly milk yield in the Friesians. The regression coefficient of milk yield on length of service period was not significant for the three herds.

INTRODUCTION

Although, the total amount of milk represented in any lactation is subject to changes, yet the different stages or parts of that lactation were seldom dealt with as independent features. Such detailed study may lead to the knowledge of which parts of the lactation are sensitive to certain environmental factors. Also, the genetic nature of each part may be revealed and the procedure of constructive selection among dairy animals could accordingly be changed to better basis.

In this investigation, the effect of age at first calving, age, month of calving, service period, dry period, on the milk yield of each month of the lactation period of buffaloes, native cows, and Friesians were studied. Effect of these factors on total milk yield was also investigated.

The inter-relationship between the different parts of the lactation were estimated in order to know to what extent those parts are related to each other.

Therefore, the effect of the nongenetic factors could be well controlled and orientated to better and more efficient systems of husbandry leading to higher levels of production.

MATERIALS AND METHODS

The data used in this investigation were obtained from the milk records of the dairy herds belonging to the Animal Breeding Department, Faculty of Agriculture, Cairo University, and the Animal production Department, Tahreer Province.

The total number of records in this work was 1244 lactations from 681 animals including buffaloes, native cows, and Friesians. The number of animals in each herd and the corresponding number of lactations were as follows :

Animals	No. of Animals	No. of Lactations
Buffaloes	103	308
Native cows.	187	258
Helstein Friesians	391	678
Total	681	1244

Incomplete and doubtful records were excluded in both herds, and records of animals milking less than 200 days were not used. Dry period and service period were given in days, while age at first calving was given in months and absolute age was given in years.

In estimating the effect of age at first calving, age, dry period and service period on milk yield regression coefficients were used. Analysis of variance was used in studying the effect of the previous factors and the month of calving on milk yield. Time unit used in calculating the regression coefficient were months. Statistical analysis was carried out according to Snedecor (1946).

Animals were fed on clover from December to May and those giving more than 20 lbs. of milk per day are given extra ration of concentrates equivalent to their excess quantities of milk. The concentrates mixture used for high producing animals is compared of cottonseed cake, wheat bran, and rice bran with 0.5% salt. Cows are hand milked twice daily at 7 a. m. and 4 p.m. and daily milk records are kept. Buffaloes and native cows are usually fed on concentrates during summer with a limited amount of green fodder, and they are kept tethered in open sheds all day.

Friesians in the Tahreer Province are fed also either on alfalfa or clover during the period from October to May and during summer, alfalfa is the only available green fodder. Concrete dairy brans are constructed to protect the animals from hot weather during summer months and from cold wind during winter. Grazing at night, reducing the amount of fibrous food in the ration, as well as applying different cooling treatments were used during hot summer days.

The following table includes the symbols used in this investigation.

Table of Symbols

Items	Symbols
Average	Av.
Total milk yield	M.Y.
Preceding Dry period	D.P.
Service Period	S.P.
Number	No.
Significant at 5%	×
Significant at 1%	××
Buffaloes	B.
Native Cattle	N.
Friesians	F.
Relative Yield	R.Y.
Class Interval	C.I.
Percentage	Perc.

RESULTS AND DISCUSSION

The Effect of Age at First Calving

Buffaloes

It is evident from Table (1) that most heifers were mated when they were ever 35 months of age. About 53.4% of the heifers studied calved below the modal group, and nearly 23.4% of the heifers calved obove the modal group.

The average age at first calving was 37 months which is in close agreement with that reported by khishin (1951) Asker and Ragab, (1951), Ragab *et al* (1953), and Youssef and Asker (1959). Ashfaq and Mason (1954), and Rife (1959) in India and Pakistan estimated the average age at first calving as 47 and 45.7 months which is higher than our estimate. The regression coefficient of the milk yield of the first lactation on age at first calving was 0.66 and not significant. It was found had a significant effect on the milk yield during the sixth, seventh, eighth, and eleventh months of the lactation. Milk yield of the rest of the months of the lactation was not affected by age at first calving, Table (2).

Native Cows

The average age at first calving of native cows was 34 months which is in close agreement to what reported by Asker and Ragab

(1951) and Ragab *et al* (1954), while it is less than that reported by El-Itriby and Asker (1958) and Asker *et al* (1959) being 42.4 and 44.3 months respectively. The regression coefficient of milk yield on age at first calving was −0.78 and not significant.

Age at first calving had no effect on milk production of all months of the lactation, Table (2).

Friesians

The average age at first calving of Friesian was 30 months which is in agreement with that obtained by Ragab and Asker (1959) and less than the estimate of 34.2 months obtained by El-Itriby and Asker (1958).

No significant effect was found for age at first calving on the first, second, fifth, sixth and eleventh months of the lactation. However, significant effect was found for the milk yield of the rest of the lactation, Table (2).

TABLE 1.—**Frequency Distribution of Age at First Calving**

Buffaloes			Native Cattle			Friesians		
Age in Months	No.	%	Age in Months	No.	%	Age in Months	No.	%
26	4	9.4	32	5	13	20	4	1.5
29	2	4.6	33	6	15	21	8	2
30	2	4.6	34	7	18	22	7	2
32	4	9.4	35	2	5	23	28	8
33	2	4.6	36	4	10	24	35	10
34	7	16.2	37	4	10	25	33	9.5
35	2	4.6	38	4	10	26	18	5
36	10	23.2	39	3	8	27	9	2.5
37	10	23.4	40	2	5	28	10	3
(over)			41	2	6	29	13	3.5
						30	14	4
						31	25	7
						32	25	7
						33	21	6
						34	24	7
						35	33	9.5
						36	12	3.5
						37 (over)	34	9.5
Total ..	43	100	Total ..	39	100	Total ..	353	100

TABLE 2.—F. value for the effect of age at first calving as monthly yield

Character	Breed	Monthly Production											
		1	2	3	4	5	6	7	8	9	10	11	305 days
Age at first calving	B.	1.41	1.52	1.84	1.89	1.90	2.28	2.71	2.21	0.75	0.79	3.35	1.75
	N.	0.69	1.27	1.28	1.68	1.05	0.71	0.54	0.77	0.08	0.17	0.04	0.88
				××	××			××	××	××	××		××
	F.	1.07	1.54	2.96	10.40	1.68	1.38	4.48	3.88	4.39	2.61	1.49	8.25
		××	××	××	××	××	××	×					××
Age	B.	8.68	4.90	8.07	5.20	4.54	5.18	3.45	1.66	1.75	0.90	1.32	5.12
		××	××	××	××	××	××	××	×				××
	N.	8.23	8.86	7.92	7.56	7.11	5.00	3.94	3.20	1.76	0.43	2.22	5.94
		××	××	××	××	××	××	××	××			×	××
	F.	128.66	119.21	74.14	73.97	52.57	19.70	37.02	15.87	1.92	1.20	3.02	59.47
		×	××	××	××	××	×	×	××	×			××
Month of Calving	B.	2.40	4.05	3.25	2.61	2.34	1.95	2.75	2.11	1.28	0.79	0.54	4.73
		×	×							×	××		
	N.	1.89	2.06	1.42	1.55	1.41	1.44	0.89	1.58	2.00	2.74	1.22	1.00
		××	××	××	××	××	××	××	××	×	××	××	××
	F.	1.96	2.88	3.39	5.20	4.00	5.80	7.29	8.59	1.78	5.68	8.23	10.42
												×	
Preceding Dry Period	B.	0.63	0.46	0.31	0.29	0.58	0.32	0.63	0.55	1.39	0.84	1.93	0.54
		×	×	×									
	N.	2.26	2.17	2.07	2.00	1.18	1.91	1.09	1.16	1.09	0.79	1.44	1.60
		×		×	××	××	××	××	××	×	××	×	××
	F.	1.77	1.04	1.80	2.11	2.47	3.22	3.23	3.47	1.63	1.99	1.88	13.30
		×				×	××	××	××	×			×
Service Period	B.	2.23	1.61	1.89	2.08	2.63	3.02	3.43	4.43	2.46	1.21	1.48	2.36
	N.	0.69	1.22	0.65	1.07	0.68	0.88	0.75	0.18	0.99	0.63	0.74	0.47
		×	××	×	××	××	××	××	××	××	××	×	××
	F.	2.05	3.26	2.27	3.03	3.76	3.84	3.76	4.59	4.80	6.93	2.14	3.12

The Effect of Age

Buffaloes

Results obtained using lumped lactation method for the effect of age monthly yield indicated that the rate of increase in monthly records was the highest at the first month then declining as the lactation advanced, Table (3). The amount of increase was also lower in all months of the second lactation compared to the third, fourth, and fifth lactation, then followed by the third and the fourth lactations being the highest. The highest increase was that of 46.7% occurring at the first month of the fourth lactation, while the lowest was that of 6.7% for the tenth month of the fourth lactation.

The rate of increase from the first to the second lactation was higher than that from the second to the third lactation. There was a decrease, however, from the fourth to the fifth lactation.

Using the paired lactation method, it was noticed that the relative increase from the first to the second, third and the fourth lactations was 10.6%, 12.1%, 18.2% for the first month, and the peak production was reached at the fourth lactation. However, the rate of increase was highest at the first month, then decreased as the lactations advanced, Table (4). Decrease in monthly milk production was more pronounced during the first lactation compared to other lactations studied.

In both lumped and paired lactation methods, the maximum total milk yield was attained at the fourth lactation. This result is in close agreement with that found by Maymone in Italy (1942), Alim (1957) and Afifi (1961) in this country.

Age had a significant effect on milk yield of the first seven months, Table (2), of the lactation while the last four months were not affected.

Native Cows

The lumped lactation method was used to estimate the effect of age on monthly milk yield, Table (3). This table showed that the rate of increase from the first to the second lactation was 47.1%, 28.6% and 20.5% for the first three months, and 21.1%, 32.4% and 33.2% from the second to the third lactation respectively. There was a decrease in monthly milk yield from the third to the fourth lactation being 12.7%, 16.7%, 13.9% and 7.2%, 18.4% and 19% respectively from the fourth to the fifth lactation.

In the five lactations studied the highest increase was that at the first month of the third lactation (68.2%) while the lowest was that at the eleventh month of the second lactation being 43.4%. The rate of increase was highest at the first month then declining as the lactations advanced. The amount of increase was lowest in all months of the second lactation, followed by the third lactation being the highest.

When using the paired lactation method the increase in the first months milk yield from the first to the second lactation was 35.5% and 25.7% from the second to the third lactation. A decrease of 22.3% was found from the third to the fourth lactation for the same month. In the four lactations the rate of increase was highest in the first month then declining as lactations advanced. The amount of increase was lowest in all months of the fourth lactation compared to the second and third lactation. The highest rate of increase was that of the third lactation.

The rate of increase in milk production was higher in the case of the lumped lactation method than that obtained by using the paired lactation method. As the paired lactation method excludes the effect of selection; the differences between the results obtained for the effect of age using this method and the lumped lactation method are expected.

It is evident from table (2) that age had a significant effect on the yield of the first eight months of the lactation.

Friesians

It was noticed from table (3) that the amount of increase in milk yield was lowest in all months of the second lactation compared to the third, fourth, and fifth lactations when using the lumped lactation method. The highest increase in monthly milk yield was that of the fifth lactation. The drop in milk yield from the first month to the fifth month was the higher in the fourth lactation but lower in the second lactation. In the five lactations the highest increase was that of the first month at the fifth lactation, while the lowest increase was that of the eleventh month at the same lactation. The highest rate of increase was that found from the first to the second lactation. The rate of increase was high at the first month then decreased as the lactation advanced.

When using the paired lactation method the drop in milk yield was higher in the fifth lactation and lower in the second lactation in the whole lactations, Table (4). The highest rate of increase was that of the second month at the fifth lactation, while the lowest was that of the tenth month at the same lactation. Also, milk yield decreased as the lactation advanced. The amount of increase was lower in the second lactation compared to the other lactations.

The rate of increase measured by the lumped method was lower than the paired one. Therefore, it was noticed that the results obtained for the effect of age on monthly milk yield was in close agreement with that reported by Searle (1961).

Table (2) showed that age had a significant effect on the yield of the first eight months and the last months of the lactation. The other months of the lactation were not affected significantly by this factor.

TABLE 3.—**Effect of Age on Monthly milk yield using the lumped method**

Sequence of Months	Order of Lactation											
	Buffaloes				Native Cows				Frissians			
	2	3	4	5	2	3	4	5	2	3	4	5
1	119.4	132.5	146.7	123.2	147.1	168.2	155.5	148.3	140.9	156.2	191.0	219.9
2	115.8	127.7	140.6	121.8	128.6	161.0	144.3	125.9	140.0	160.5	196.7	214.8
3	114.0	126.9	129.3	129.5	120.5	153.7	140.0	121.0	137.7	150.9	168.8	209.4
4	110.2	119.0	119.9	124.7	116.1	148.8	136.5	123.2	135.2	142.8	161.0	193.3
5	108.2	115.4	122.9	119.8	118.3	153.4	125.2	124.8	129.5	139.0	154.1	199.2
6	106.9	114.1	121.9	117.5	117.0	147.8	115.4	124.2	122.1	130.4	149.0	168.2
7	109.3	118.3	125.3	114.5	117.3	145.8	121.5	118.3	119.8	125.4	136.1	159.5
8	113.2	124.2	124.2	113.2	121.0	144.7	128.2	127.5	112.7	118.5	121.5	124.7
9	109.8	120.1	112.4	112.4	120.3	137.2	132.7	135.8	106.0	110.4	100.0	105.0
10	121.2	128.9	106.7	130.3	90.2	112.4	102.9	110.0	102.9	107.8	112.8	83.3
11	122.0	107.5	112.6	121.1	56.6	116.2	86.6	79.8	105 0	118.6	99.3	73.2
Av. age in month	55	77	89	101	48	62	76	88	42	52	66	82

The first year monthly yields were taken as basis for comparison and considered as one hundred. Respective monthly yield in other lactation were their calculated in terms of percentage.

TABLE 4.—**Effect of Age on Monthly Milk Yield Using the Paired Method**

Sequene of Months	Order of Lactations										
	Buffaloes				Native Cows			Friesians			
	2	3	4	5	2	3	4	2	3	4	5
1	110.6	122.7	140.9	130.3	135.5	161.2	138.9	143.9	163.3	212.9	249.8
2	99.0	109.9	131.8	125.1	148.8	128 0	134.7	132.5	162.7	204.5	264.9
3	103.3	119.7	129.3	133.5	133.7	138.9	122.7	143.6	151.1	201.3	252.3
4	102.3	119.2	124.6	127.4	122.6	130.6	119.0	140.3	146.7	184.5	214.7
5	97.9	116.3	124.5	124.5	121.8	133.8	109.7	137.6	131.7	188.0	207.3
6	99.3	118.6	127.1	124.3	119.6	129.3	110.7	121.6	123.7	168.0	194.4
7	100.2	123.4	124.2	121.5	124.5	117.9	98.9	125.3	116.9	160.4	183.3
8	107.7	125.6	117.6	105.2	115.9	110.2	87.3	121.7	112.3	130.5	139.4
9	108.2	110.6	118.6	104.8	143.3	141.7	130.4	109.1	88.9	105.9	115.9
10	116.8	131.1	112.5	113.8	102.8	128.8	72.1	104.1	72.8	88.7	71.2
11	128.6	107.9	80.7	115.0	44.8	116.0	—	100.9	103.2	79.5	110.2
Av. age in months ..	55	77	89	101	48	62	76	42	52	66	82

Same rules used in calculating the values given in table (3) was used here.

The Effect of Month of Calving

Buffaloes

Table (5) was prepared where the average of all months was taken as one hundred and the different monthly yields were calculated as percentages of that averge. It is noticed that in all months of lactation during the period from April to August was the most critical one since milk yield was lower than the average. Also, the months of December, January, February and March were, in general, repersenting the most favourable period of the year, while the months of september and October were only fairly favourable.

It was indicated, Table (5), that the highest total milk yield was obtained from buffaloes calved in January and February. This agreed with that obtained by Ragab *et al* (1954), while Asker and El-Itriby (1958) found that buffaloes calving during December and March excel other animals in total milk yield.

A significant effect of month of calving on monthly milk yield for the first eight months of the lactation was found while the other months were not affected, Table(2).

Native Cattle

It is evident from Table (6) which was prepared in the same way as Table (5) that milk yield during April and June were lower than the average. Also, milk production during August and September were lower than the average till the seventh month, then it was increased after that. The most favourable period of the year as far as monthly milk production is concerned, was that from January to March.

It was also found that cows calving during the period from January to March were the only group that produced higher total milk yield than the average. Asker *et al* (1958) came to the same conclusion by studying the effect of month of calving on total milk production in another herd of native cows.

To examine differences between cows calving at various months in their milking ability, Table (2) was prepared and it showed that month of calving had a significant effect on the milk production of the first two months and the ninth as well as the tenth months of the lactation. Milk yield during the rest of the months of the lactation was not affected significantly by month of calving.

Friesians

Monthly milk yield is affected by month of calving as represented in Table (7), where the average of all months was taken as one hundred, and the months of the lactation were relatively estimated. It is noticed that September and October calvers excel other animals calving during the rest of the year in milk production of the first month after calving. The trend was kept the same for the second and third months of the the lactation and then extended to December for the fourth, fifth, and sixth months of the lactation.

Animals calving during the period from May to August started with a low monthly milk yield till the seventh month. After this month, the average monthly production rose again because it coincide with the mild weather and grean fodder.

Effect of Season

It is evident from Tables (8) and (9) that buffaloes calving during autumn and winter months, produced more milk than the average, while those calving during spring were very colse to the average in their production.

Native cows calving during autumn months gave a higher yield than the average, while the milk yield produced by winter and spring calvers was close to the average.

Higher milk production was produced from autumn calvers in the Friesians, while the winter and spring calvers were very colse to the average in their yields. Milk yield produced in summer from the three herds was at its lowest level during that season.

Table (2) showed that month of calving had a significant effect on milk yield of all months of the lactation.

TABLE 5.—Effect of month of calving on monthly milk yield in buffaloes

Month of Calving	1	2	3	4	5	6	7	8	9	10	11	305 days
January	109.2	110.4	109.4	105.6	97.7	95.3	105.2	105.9	107.9	108.8	98.7	106.0
February	108.1	114.2	110.3	103.7	107.6	98.8	105.2	106.8	106.9	112.5	106.6	80.3
March	105.1	101.3	91.4	90.3	98.9	107.5	90.9	90.9	105.9	111.4	111.7	95.2
April	66.1	60.5	62.9	71.1	76.1	90.6	80.6	85.2	99.3	116.6	92.0	80.3
May	54.8	62.1	67.3	62.5	72 0	74.7	85.6	95.2	97.6	98.1	92.0	79.5
June	42.5	54.9	64.3	64.3	66.8	72.5	72.2	71.3	77.2	93.3	79.4	65.5
July	74.2	80.0	82.6	82.0	82.9	83.9	95.7	90.9	98.0	94.8	108.7	87.3
August	103.5	106.8	101.5	104.3	106.7	105.5	108.0	106.2	112.5	100.0	84.9	104.8
September	103.5	97.9	97.7	100.0	102.2	104.0	108.0	108.5	100.9	95.1	97.4	101.1
October	95.8	93.9	96.1	98.1	97.5	100.6	98.9	97.1	96.6	91.8	108.3	97.1
November	96.9	96.9	101.5	99.8	104.5	100.6	92.6	91.7	88.0	96.6	105.0	97.5
December	101.1	101.6	101.5	102.6	98.3	99.5	92.4	94.0	100.0	104.4	96.2	99.8

The average was taken as hundred percent.

TABLE 6.—**Effect of Month of Calving on monthly milk yield in Native cattle**

Month of Calving	1	2	3	4	5	6	7	8	9	10	11	305 days
January	121.5	110.5	110.0	109.1	105.4	101.2	102.3	98.0	71.2	95.0	49.7	102.4
February	101.9	106.8	110.0	109.6	112.4	115.0	108.2	96.5	84.7	93.7	106.2	105.5
March	110.2	106.1	107.2	117.5	118.3	118.4	108.5	97.3	71.7	122.7	125.6	107.4
April	102.9	94.2	82.3	81.7	71.0	57.5	61.6	55.9	64.8	66.9	—	75.6
May	105.3	100.0	104.2	117.0	118.1	136.9	119.8	109.2	114.3	71.4	146.5	120.0
June	71.0	67.4	74.4	74.0	74.3	83.0	68.4	59.8	67.1	54.9	70.6	80.2
July	115.6	120.0	121.7	112.9	107.0	108.9	103.7	98.4	135.6	233.4	137.6	123.4
August	83.5	91.9	92.5	93.7	95.6	94.7	95.5	108.1	122.6	124.5	116.2	100.6
September	80.3	88.9	91.9	92.3	93.2	91.0	92.8	122.7	106.9	93.3	118.3	92.2
October	103.9	95.2	94.2	89.9	93.2	95.3	105.1	93.8	94.9	89.7	76.9	95.0
November	107.1	110.7	108.7	106.7	107.0	106.7	106.5	106.1	116.2	95.0	96.8	109.8
December	100.7	96.1	97.8	100.0	96.7	96.3	92.1	90.7	95.3	88.3	86.3	95.3

The average was taken as hundred percent.

TABLE 7.—**Effect of month of calving on monthly milk yield in friesians**

Month of Calving	1	2	3	4	5	6	7	8	9	10	11	305 days
January	100.6	103.4	102.5	101.5	102.3	100.6	99.6	90.7	90.0	85.8	88.2	97.7
February	95.9	96.5	99.5	100.0	98.2	93.7	89.7	88.2	88.4	95.8	91.5	95.3
March	100.7	101.3	103.1	102.3	98.1	93.4	92.1	94.2	97.4	96.6	100.4	99.6
April	97.3	98.0	97.9	92.6	87.2	88.5	89.8	94.8	96.2	99.9	98.8	96.2
May	99.5	96.2	91.1	84.3	91.7	86.8	90.7	97.3	98.8	102.0	131.7	95.8
June	86.7	79.2	81.1	79.6	80.5	83.8	86.7	99.0	104.1	93.5	121.3	92.3
July	87.7	84.7	80.9	77.4	86.6	93.5	102.1	111.1	114.3	113.5	123.7	95.2
August	91.9	88.2	85.6	81.5	91.1	97.3	104.2	110.9	114.9	114.7	120.9	98.8
September	106.9	118.9	108.0	105.0	110.7	116.7	118.3	119.6	122.9	129.0	119.5	112.4
October.	106.3	97.3	98.6	107.1	106.1	107.4	108.1	107.8	107.6	94.4	97.4	103.9
November	96.0	94.7	96.9	99.7	99.9	103.2	102.9	104.0	100.8	107.3	91.1	97.7
December	109.0	111.9	112.1	109.7	108.0	109.8	109.8	107.7	100.6	92.5	95.4	106.6

The average was taken as hundred percent.

TABLE 8.—**Effect of season of calving on monthly milk yield**

Season	Animal	Sequence of months										
		1	2	3	4	5	6	7	8	9	10	11
Spring . . .	F.	747	765	716	650	611	551	517	499	456	427	448
	N.	433	524	460	439	379	339	282	227	181	195	173
	B.	399	444	423	394	387	367	340	318	306	294	236
Summer . .	F.	669	653	607	556	520	563	555	555	520	416	495
	N.	368	487	452	389	342	311	261	230	234	308	207
	B.	389	479	474	441	449	391	365	315	289	259	218
Autumn . .	F.	743	805	744	727	699	671	624	574	517	474	417
	N.	396	514	462	401	362	318	296	279	229	208	186
	B.	517	573	563	524	492	454	397	349	288	255	248
Winter . . .	F.	767	807	770	724	681	623	567	496	438	393	372
	N.	441	547	498	442	388	339	295	246	181	207	154
	B.	562	647	613	549	492	451	401	360	317	293	240

TABLE 9.—**Effect of season of calving on total milk production**

Animal	Spring	Summer	Autumn	Winter	Av.
F.	6294	6180	6780	6466	6430
N.	3273	3287	3560	3277	3349
B.	3982	3887	4527	4315	4178

The Effect of Preceding Dry Period

Buffaloes

The average dry period was found to be 147 days, Table (10). It is apparent that the average length of the perceding dry period decreases as age advanced, and the first dry period is longer than any of the subsequent ones which agrees with that reported by Ragab *et al* (1954) and Afifi (1961).

Animals were divided into classes of 30 days dry period interval as represented in Table (11). It was noticed that highest producing animals were those having a dry period ranging from 30 to 90 days. The milk production decreased whenever the dry period increased. The regression of milk yield on dry period was —0.38 and not significant which is in close agreement with that reported by Ragab *et al* (1954) and Afifi (1961).

Studying the effect of dry period on monthly milk yield using the analysis of variance showed that the dry period had no effect on milk yield in all months of lactation except the last month which was affected significantly by the dry period, Table (2).

Native Cows

The average dry period was found to be 127 days and the average length of preceding dry period declined as age advanced with the first being the longest one, Table (12). Such results agree with that reported by Hilmy (1954).

Animals were divided into classes of 30 days dry period interval as represented in table (11). It was shown, in general, that the total milk yield decreased with the increase of the preceding dry period. The regression of milk yield on dry period was 0.229 and non-significant. Asker *et al* (1959) reported that the preceding dry period had a negligible effect on milk production.

The effect of the preceding dry period on monthly milk yield is presented in Table (2). The results showed a significant effect on milk yield of the first three months of the lactation. No effect was noticed from the fourth month to the eleventh month of the lactation period.

TABLE 10.—**Average Length of Preceding Dry Period for Different Lactations for Buffaloes, Native cows and Friesians**

Buffaloes			Native Cows			Friesians		
Sequence of Lactation	No. of An.	Av. D.P. in days	Sequence of Lactation	No. of An.	Av. D. P. in days	Sequence of Lactation	No. of An.	Av. D. P. in days
2	31	164	2	23	145	2	197	105
3	16	193	3	11	97	3	75	80
4	13	138	4	10	118	4	12	43
5	9	121	5	7	145	5	2	57
6	7	126	6	4	129	—	—	—
T. & Av.	76	147	T. & Av.	55	127	T. & Av.	286	95

TABLE 11.—**Effect of Preceding dry Period on Total Milk Yield in Buffaloes, Native cows and Friesians**

Buffaloes			Native Cows			Friesians		
D. P.	Av. M. Y.	R. Y.	D. P.	Av. M. Y.	R. Y.	D. P.	Av. M. Y.	R. Y.
30	505	102.08	30	307	89.24	20	620	82.66
60	493	99.65	60	263	76.45	40	645	86.00
90	493	99.65	90	538	104.06	60	757	100.93
120	471	95.20	120	393	114.24	80	757	100.93
150	465	93.99	150	402	116.86	100	767	102.26
180	561	113.40	180	321	93.31	120	762	101.60
210	528	106.73	210	337	97.96	140	780	104.00
240	504	101.87	240	317	92.15	160	759	101.20
270	437	88.33	270	399	115.98	180–340	903	120.40
Av.	494.7	100 00	Av.	344	100.00	Av.	750	100.00

Friesians

The average preceding dry period was estimated as 95 days, which is in close agreement with the finding of El-Itriby and Asker (1958), and less than that obtained by Ragab and Asker (1959) being 107 days. It is apparent that the first dry period is longer than any of the subsequent ones which agrees with Sanders (1927). In general, the length of preceding dry period decreased as age advanced.

When animals were arranged into classes of 20 days class interval, Table (11), it was found that milk yield decreased with the increase of the preceding dry period. It is also noticed that milk production increased with the length of the dry period till a dry period of 100 days was reached.

The regression of milk yield on preceding dry period was 0.24 and statistically significant.

A significant effect of preceding dry period on monthly milk yield was found on all months of the lactation except the second month where no effect on milk yield was found, Table (2).

The Effect of Service Period

Buffaloes

The average service period of 144.5 days arrived at in this work is shorter than that obtained by Zaher (1944), and Ragab *et al* (1954 & 1956) which were 289, and 164 & 177 days respectively, Table (12). The regression coefficient of milk yield on service period was 0.025 and not significant. Such results are not in agreement with that reported by Ragab *et al* (1954) who found a highly significant regression of milk yield on service period. However, milk yield was found to increase as service period increased up to 150 days, Table (13), when animals were divided into calsses of 50 days service period.

The service period had no effect on milk yield of the second, third, fourth and the last two months of the lactation, while the other months were influenced significantly, Table (2).

Native Cows

The average service period was estimated as 98.9 days, Table (12) which is very close to that estimated by Ragab (1945) and Hilmy (1954). It can be noticed from Table (15) that milk yield increased as service period increased up to 90 days, then production decreased with the increase of the service period, when animals were divided into classes of 30 days service period. The regression coefficient of milk yield on service period was found to be 0.06 and this estimate is not significant.

The monthly yield was not affected by service period as analysis of variance showed in Table (2).

Friesians

The average service period was found to be 114.3 days which is less than that reported by El - Sheikh (1960) being 130.9 days. Table (12) showed that the length of the service period declined as lactations advanced.

When animals were divided into classes of 50 days service period as represented in Table (13), it was found, in general, that milk yield decreased with the increase of service period. The regression of milk yield on service period was found to be not significant (0.042). Service period had a significant effect on montly milk yield of the lactation, Table (2).

TABLE 12.—**Average Length of Service Period of Different Lactations for Friesians, Native Cows and Buffaloes**

Friesians			Native Cows			Buffaloes		
Sequence of lactation	No. of An	Av. S. P.	Sequence of lactation	No. of An.	Av. S. P.	Sequence of lactation	No. of An.	Av. S. P.
2	128	183	2	25	127.9	2	29	165
3	56	104	3	14	79.5	3	12	144
4	10	56	4	11	79.2	4	14	116
—	—	—	5	7	109.0	5	11	153
T. & Av.	194	114.3	T. & Av.	57	98.9	T. & Av.	66	144.5

TABLE 13.—**Effect of service period on milk yield in native cows, buffaloes and Friesians**

Native Cows			Buffaloes			Friesians		
S. P. in days	Av. M. Y.	R. Y.	S. P. in days	Av. M. Y	R. Y.	S. P. in days	Av. M. Y.	R. Y.
30	343	97.72	50	441	87.58	50	751	101.4
60	320	91.16	100	483	95.92	100	743	100.4
90	368	104.84	150	485	96.32	150	754	101.8
120	358	102.00	200	447	88.77	200	710	95.9
150	340	96.86	250	555	110.22	250	817	110.4
180	349	99.43	300	563	111.81	300	872	117.8
210	379	108.00	350	582	115.59	350	886	119.7
			400	472	93.74	400	617	96.9
						450	603	81.5
						500	885	119.6
						550	602	81.5
Av.	351	100.00	Av.	503.5	100.00	Av.	740	100.0

DISCUSSION

It was clear from the results obtained in this investigation that age at first calving had no effect on monthly milk yield in native cows. Monthly milk production in buffaloes was not affected by age at first calving, with the exception of the yield of the sixth, seventh and the eighth months. However, in the Friesians, significant effect was found for the milk yield of the third, fourth months and the period between the seventh and tenth months of the lactation.

Age had a significant effect on the yield of the first eight months of the lactation in Friesians and native cows. Studying the influence of this factor on the monthly yield of buffaloes indicates that it affects the yield of the first seven months only. The result of the lactation, however, was not affected by age in the case of the three groups studied. It should be noted too that age of the animals affects the total milk significantly for all animals studied.

Milk yield in dairy animals increases with the advance in age until it reaches the maximum production and then declines. The increase in yield is due to the increase of the size of the animals, greater digestive, and udder capacity. The decrease of production with with advancing age is mainly due to senelity.

Monthly yield decreases as lactation progresses indicating that in later part of lactation the production of young cows is very similar to that of mature ones. (Searle, 1961).

Month of calving had a significant influence on all the montly milk yields in the Friesians, and in the native cows at the first, second, ninth and tenth months of the lactation. Studing the effect of this factor on monthly milk yield in the buffaloes indicates that only the last three months of the lactation were influenced.

Results obtained for the three herds showed that animals calving during the months between September and February are the best producers. This is due to the that clover in Egypt is available only during winter season and animals calving during this season had a better chance for utilizing this pasture. The season of green fodder, *i.e.* Barseem, is rather mild in weather since it begins in November and ends at May. The beginning of the dry season is actually the beginning of summer season and hot climate.

The preceding dry period showed a significant effect on the eleventh month only in buffaloes, while it showed a significant influence on the first three months of the lactation in native cows. Dry period showed no effect on milk yield of the second month of the lactation of the Friesians, while significant effect on the rest of the months was found.

However, the buffaloes were not affected by the dry period because the average dry period was higher than that of the critical mean beyond which milk production would be influenced. The Friesians on the contrary had no chance to rest for the optimum period (60 days) in the third and fourth lactations.

Comparing the results of the three herds studied, it was found that the dry period for pure Friesians was the shortest, while the native cattle was longer and the buffaloes had the longest one. Milk production increased with the increase of the dry period until a dry period of 90 to 100 days in the Friesians, 150 days in the native cows and 60 to 90 days in the buffaloes were attained. There was no inerease in milk yield with the increase in dry period beyond the above mentioned estimates.

The dry period is an important item in the animal's life since it enables it to renew in the body the stores of minerals which may have been depleted through milk production. It also helps to build up a reserve of body flesh before calving and to give enough rest the organs of milk secretion.

The service period had no effect on the monthly milk yield in native cows, while a sigsificant influence on all months of the lactation in the Friesians was obtained. The buffaloes showed a significant effect on the first month of the lactation and the period from the fifth to the ninth of the lactation.

The average service period estimated in this work for buffaloes, native cows and Friesians were 144.5, 98.9 and 114.3 days respectively. The long service period found in buffaloes may be due to the fact that the oestrus cycles in this animal are not noticed due to silent heats.

The results of this work for the three different herds, indicate that the first service period was the longest, and this may be due to the tendency for milking heifers to be served later than the average of older ones to avoid stunting growth, but the rise in the case of old cows may be attributed to senility, which accompanies in most cases low standard of fertility.

It may be suggested that the average service period in pure European cattle should be at least 90 days because the three months interval between calving and serving was regarded from the biological standard as a necessary period of sexual recuperation and the shortening of this interval in cattle has an unfavourable influence on both health and milk yield.

PRACTICAL APPLICATIONS

This study has proved that the pattern of influence of age at first calving, age, month of calving, dry period and service period on monthly yield is independent from that on the total yield in the animals studied.

Also, each of those factors affected the monthly yield in each animal studied differently. In general, the native cattle were the least sensitive to such influences followed by the buffaloes where the influence showed itself in most of the monthly yield except for the dry period which showed no effect. The Friesians were sensitive for such influences all through the lactation. This trend shows clearly that the more dairy is the animal the more sensitive it is.

In the native cattle, changes in age at first calving and service period did not cause any significant changes in the monthly milk yield. Therefore it could be suggested that the native cattle could be served at the earliest time without any fear of loss in milk production. Also, if the native cattle is served as early as possible no loss in milk production is expected, but the contrary one more lactation is gained over and above the extra calf which is going to be secured.

In the case of the Friesians, the effect of age at first calving is noticed at the third month and over, while the buffaloes show that influence from the sixth month on. It is questioned whether a system of steaning up feeding during the critical period could help in putting down such effects or not. Such experiments based on the role played by nutrition in shaping the lactation curve of both the Friesians and buffaloes in consideration of such factors must be carried out.

In conclusion, it could be inferred that the nongenetic factors affected the total milk yield in buffaloes and Friesians through the detailed effect of those factors on each months yield individually. While in the native cattle, where no effect was noticed only few months were affected a state of compensation and balance took place between the effect and non-affected months.

The results obtained in general, denote clearly to the critical months of the lactation in each animal where good care, proper feeding and management should be followed in a way to compensate for the expected deleteriously effect.

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أثر بعض العوامل البيئية والوراثية على ناتج اللبن الشهرى فى كل من الجاموس المصرى والأبقار المصرية وأبقار الفريزيان

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الملخص

تناولت هذه الدراسة ١٢٤٤ سجلا موسميا لنـاتج اللبن ناتجة من ٦٨١ حيوانا وقسم كل سجل منها الى فترات شهرية (٢٨ يوما) كل فترة كانت تمثل ناتج اللبن فى اربعة أسابيع . وكان كل سجل حليب سنوى يشمل فى المتوسط عشرة سجلات مما جعل مادة التحليل تحتوى على ١٢٤٤٠ ناتجا شهريا موزعة على الجاموس والأبقار المصرية والفريزيان .

١ ــ بلغ متوسط العمر عند أول وضع ٣٧ شهرا للجاموس و ٣٤ شهرا للأبقار المصرية و ٣٠ شهرا للفريزيان . كذلك فان معظم العجلات الجاموس تلد وهى فى سن ٣٥ شهرا تقريبا . بينما معظم عجلات البقر المصرى تلد فى عمر ٣٤ شهرا . أما فى حالة الفريزيان فان عجلات هذا النوع تضع معظمها فى عمر ٣٤ شهرا .

وقد تبين أن هـذا العامل لا يؤثر على ناتج اللبن الشهرى فى المـاشية المصرية أما فى الجاموس فقد كان له اثر معنوى على ناتج اللبن فى الشهر السادس والسابع والثامن التالية للوضع . أما فى الأبقار الفريزيان فان هذا العامل يؤثر على ناتج لبن الشهر الثالث والرابع وكذا المدة من الشهر السابع الى الشهر العاشر .

٢ ــ وقد وجد أن أقصى ادرا سنوى وصلت اليه الحيوانات هو الموسم الرابع للجاموس والموسم الثـالث للبقر المصرى والموسم الخـامس للفريزيان عند ما كان متوسط العمر ٨٩ شهرا للجاموس و ٦٢ شهرا للبقر المصرى و٨٢ شهرا للفريزيان .

٣ ــ كما تبين من الدراسة أن أغلب الحيوانات تلد فى الفترة ما بين شهر سبتمبر وشهر فبراير وأن أقل نسبة هى التى تضع فى الفترة من شهر أبريل الى يولية . وقد وجد أن الجاموس الذى يلد فى الفترة بين شهرى أبريل وأغسطس ينتج لبنا أقل من المتوسط بينما الذى يضع فى شهور ديسمبر ويناير وفبراير ومارس عموما ينتج لبنا حوالى المتوسط تقريبـا . أما الحيوانات التى تضع فى شهرى سبتمبر وأكتوبر فهى الأعلى ادرارا من كل الحيوانات .

أما الماشية المصرية فقد تبين أن أحسن فترة من السنة يمكن الحصول فيها على أعلى كمية من اللبن هى التى بين يناير ومارس . أما بالنسبة للفريزيان فقد اتضح أن ولادات شهرى سبتمبر وأكتوبر تفوق ولادات باقى شهور السنة فى انتاج اللبن للشهر الأول بعد الوضع وكذلك الشهر الثانى والثالث للموسم وتمتد هذه الفترة لشهر ديسمبر بالنسبة للشهر الرابع والخامس والسادس فى موسم الحليب .

٤ ــ بلغ متوسط مدة الجفاف السابقة للجاموس ١٤٧ يوما وللبقر المصرى ١٢٧ يوما وللفريزيان ٩٥ يوما .

وبمقارنة نتائج الحيوانات الثلاثة وجد أن أقل مدة جفاف سابقة كانت للفريزيان يليها البقر المصرى ثم الجاموس الذى سجل أطول مدة جفاف .

٥ ــ بلغ متوسط مدة التلقيح للجاموس ٣ر١١٤ يوما وللأبقار المصرية ٩ر٩٨ يوما وللأبقار الفريزيان ٥ر١٤٤ يوما . وتبين من التحليل الاحصائى أن ناتج اللبن السنوى يزيد بزيادة مدة التلقيح حتى تصل الى ١٥٠ يوما فى الجاموس و٩٠ يوما فى الأبقار المصرية والفريزيان ثم يقل اللبن بعد ذلك مدة التلقيح .