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# ESTIMATION OF BUFFALO MILK YIELD BY RECORDING AT DIFFERENT INTERVALS

BY

A. A. YOUSSEF<sup>(1)</sup>, Y. M. TOLBA<sup>(2)</sup> AND MISS S. D. AHMED<sup>(3)</sup>

## SUMMARY

Milk records of 168 lactations produced by 94 buffalo cows completed during 1954-1957 have been used for studying the accuracy of estimating milk production by recording at different time intervals. Correlation coefficients, percentages of actual yield, and the frequency of differences exceeding  $\pm 5\%$  have been studied for lactations grouped according to order of lactation and milk yield level.

The magnitude of difference decreases as the milk yield increases and the difference increases as the interval of recording increases.

The percentage error when signs are ignored is 1.22, 1.56 and 2.47 for recording one day in every 7, 14 and 28 respectively. The average difference between recording one day every week and one day every four weeks is less than 50 lbs. for a lactation yield of 4000 lbs.

The frequency of error larger than  $\pm 5\%$  of the actual yield is one in 56, 168 and 9 for recording one day every one, two and four weeks respectively.

The results show that milk recording one day in every four weeks would provide an accurate estimation of milk yield for practical purposes.

Milk production of dairy cattle is considered the most important criterion for evaluating individual animals or herds and for proving sires and estimating the improvements that occur due to breeding programmes. As the daily recording of milk yield throws a heavy burden

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<sup>(1)</sup>, <sup>(2)</sup> and <sup>(3)</sup> Ministry of Agriculture, Animal Production Department.

on both the recorder and cattle owner, a number of workers have attempted to estimate the milk yield by recording the milk yield at different intervals, ranging from once every three days to once every three months and testing the accuracy of the different methods of estimating the milk production, Alexander and Yapp (1949), Ashour (1939), Bayley *et al* (1952), Erb. *et al* (1952), MacCarthy and Boyle (1946) and Narayan *et al* (1957).

However, this has been undertaken with cows, and there has been no work reported on buffaloes. In the Egyptian region of the United Arab Republic the buffalo is considered the important dairy animal. According to the agricultural statistics of 1958 (5) the number of milking buffaloes was 830, 906, while the number of cows was 597, 468. Moreover, breed societies are about to be formed and milk recording will be one of their main activities. This work was carried out to compare the accuracy of estimating the milk production of buffaloes by recording at various intervals with that of the actual milk yield as computed by daily recording. The intervals of milk recording were as follows :

- a) one week every four weeks
- b) one day every week
- c) one day every two weeks
- d) one day every four weeks.

#### PROCEDURE AND RESULTS

Milk records comprising 168 lactations completed during the years 1954-1957 including produced by 94 buffalo cows kept at the animal breeding experimental station at Sakha were used for this study. The animals were hand milked and the milk was weighed and recorded twice daily at 7 a.m. and 5 p.m. All calves produced were bucket fed.

The milk yield of each lactation was computed according to the four above mentioned intervals of recording by dividing the lactation period into intervals of 28 days each and computing the milk yield of each of these intervals according to the method of recording. Lactations of less than 100 days were excluded. Lactation periods studied ranged

Table 1

Order of Lactation	No.	Method of Recording	Aver. milk yield	Estimated milk yield as of daily recording	Diff. of mean from daily rec. lb.	Aver. diff. from daily rec. lb.	Aver. % error sign ignored	Frequency of error larger than +5%
1	37	Daily	2489	100.0				
		One week every	2528	101.56	+ 39	+ 35.72	2.72	1 in 9
		1 day every	2493	100.16	- 4	+ 5.08	1.39	1 in 18
		1 day every	2488	99.95	- 2	+ 2.08	1.8	nil
		1 day every	2487	99.91	- 1	- 4.91	2.83	1 in 6
2	27	Daily	3552	100.0				
		1 week every	3589	101.04	+ 37	+ 35.14	2.64	1 in 9
		1 day every	3549	99.91	- 50	+ 0.88	1.21	1 in 27
		1 day every	3537	99.57	- 15	- 17.22	1.61	1 in 27
3	31	1 day every	3502	99.59	- 2	- 45.22	2.42	1 in 7
		Daily	3991	100.0				
		1 week every	4031	101.0	+ 40	+ 39.80	1.7	1 in 31
		1 day every	3980	99.72	- 11	- 12.19	1.2	nil
4	16	1 day every	3989	99.94	- 24	- 2.83	1.7	nil
		1 day every	3967	99.39	- 2	- 24.19	2.8	1 in 5
		Daily	4123	100.0				
		1 week every	4152	100.94	+ 39	+ 39.43	1.8	1 in 16
5	57	1 day every	4123	100.0	+ 00	+ 10.56	1.12	nil
		1 day every	4105	99.56	- 11	- 17.68	0.85	nil
		1 day every	4142	99.73	- 18	- 4.00	1.97	nil
		Daily	4153	100.0				
		1 week every	4208	101.32	+ 55	+ 53.66	2.18	1 in 8
Total.....	168	1 day every	4161	100.19	+ 8	+ 7.22	1.15	nil
		1 day every	4146	99.83	- 7	- 7.80	1.51	nil
		1 day every	4149	99.90	- 4	- 2.68	2.25	1 in 14
		Daily	3557	100.0				
		1 week every	3702	101.23	+ 45	+ 42.77	2.25	1 in 11
1 day every	3658	100.02	+ 1	+ 2.47	1.22	1 in 56		
1 day every	3650	99.80	- 7	- 6.50	1.56	1 in 168		
1 day every	3643	99.61	- 14	- 14.10	2.47	1 in 9		

from 100 to 580 days, with an average of  $287.5 \pm 90.3$  days. The milk yields were taken only to the eleventh period of four weeks, or in other words up to the 308th day. Of the 168 lactations of this study 64 were of more than 308 days.

Lactations completed in each of the four years under study were grouped into five groups, buffaloes with their first, second, third, fourth and fifth and more calves. Each of these groups was divided into three sub-groups according to yield level in these divisions : lactations of less than 2000lbs. of milk, between 2000 and 3000lbs., and more than 3000lbs. This was done to determine whether different methods of milk recording were affected by level of production. The unadjusted milk yields of the study ranged from 495 lbs. to 7098 lbs., with an average of  $3657.8 \pm 1401$  lbs.

The accuracy of the estimated milk yield according to interval of recording was first studied by means of correlation between estimated and actual milk yields. All correlations obtained for the groups and sub-groups were very high, to the point that it was impossible to compare the relative accuracy of recording intervals. (Range 0.853-0.999) McCarthy and Boyle (1956) have pointed out that a correlation coefficient measures the extent to which the types of records fluctuate together, rather than the extent to which they are identical.

The estimated milk yields of the various recording intervals were then compared by expressing them as percentages of the actual daily recorded milk yield, difference of mean yields from daily recorded, average of differences, average per cent. difference and the frequency of differences exceeding  $\pm 5\%$ .

Table 1 shows comparisons of the lactations grouped according to the order of lactations, and Table 2 gives comparisons of lactations grouped according to level of production.

Table 1 shows that differences between milk yields for the various recording intervals and daily records is not large, not exceeding  $\pm 2\%$ . Estimated yield based on recording for one week showed the highest difference, apart from monthly recording for the second calves, and it tends to over-estimate the yield, despite the fact that animals were recorded on a larger number of days. Otherwise the interval of recording

TABLE 2

Level of Production	No.	Method of Recording	Average milk yield lb.	Est. milk yield 5 % of daily rec.	Diff. of mean from daily rec.	Aver. dif. from daily record lb.	Av. % error ignored	Frequency of error larger than + 5 %
Less than 2000 lb.	19	Daily	1201	100.0	+ 41.0	+ 41.4	4.18	1 in 4
		1 week every	1242	103.41	+ 42.15	+ 12.15	2.06	1 in 9
		1 day every	1214	101.08	+ 44.9	+ 14.9	3.01	1 in 9
		1 day every	1216	101.24	+ 45.0	+ 14.8	4.39	1 in 3
Between 2000 lb. and 3000	32	Daily	2364	100.0	+ 55.0	+ 51.5	3.0	1 in 5
		1 week every	2419	102.32	- 7	- 2.31	1.48	1 in 32
		1 day every	2357	99.70	- 8	- 8.03	1.51	nil
		1 day every	2352	99.50	- 12	- 12.6	2.76	1 in 6
More than 3000 lb.	32	Daily	4410	100.0	+ 42	+ 40.69	1.37	1 in 29
		1 week every	4452	100.95	- 4	- 2.20	1.01	nil
		1 day every	4414	100.02	- 10	- 9.6	1.35	nil
		1 day every	4388	99.50	- 22	- 19.2	2.08	1 in 15
Total...	168	Daily	3657	100.0	+ 45	+ 42.8	2.25	1 in 11
		1 week every	3702	101.23	+ 4	+ 2.47	1.22	1 in 56
		1 day every	3658	100.02	- 7	- 6.50	1.56	1 in 168
		1 day every	3643	99.61	- 14	- 14.1	2.47	1 in 2

increased the difference between the estimated and actual milk yield increased when the estimated was expressed as a percent. of the actual. When all the lactations studied were grouped the average difference percent., when the sign was ignored, reveals a steady increase of variation as the interval of recording increases, differences being 1.22, 1.56 and 2.47 percent. for recording one day every 7, 14 and 28 days respectively. The error in recording one day in every 14 did not differ much from recording one day every week, the difference being only 0.34 %. Although the difference between recording one day every four weeks and one day every week is 1.25 % yet it does not amount to more than 50 lb. of milk with a yield of 4000 lb., which is more than the average of the lactations of the study.

The average error when signs are ignored is less than that obtained by Narayan *et al* (1927) for cows, 1.22, 1.56 and 2.47 percent. for recording one day in every 7, 14 and 28 days as compared with 1.8, 2.9 and 3.6 percent. for records taken one day in every 7, 14, and 21.

The magnitude of differences increase as the milk yield decreases for all the recording intervals (see Table 2). The average error percent. when signs are ignored is least for lactation yields about 3000 lb. and greater for those less than 2000 lbs., and intermediate for lactation yields between 2000 and 3000 lb. Bayley *et al* (1952) states that percent. error of both the bimonthly and quarterly methods tends to decrease as the production of the monthly record increases. This trend may also be noticed in Table 1, where lactations are grouped according to the order of lactation, milk yields increasing with age as measured in lactations. Taking the average milk yield of the first calvers as 100, the average milk yields of the second, third, fourth and fifth and later calvers are 143, 160, 166, 167 respectively. The average errors percent. (signs ignored) for recording one day every week are 1.39, 1.21, 1.20, 1.12, and 1.15 respectively.

Although the lactations studied are not successive ones of the same individuals, so that the effect of selection is not eliminated yet the maximum milk yield has been reached at the fourth lactation. This result does not agree with that found by Ragab *et al* (1953), who found that maximum milk yield was obtained at the third lactation with a

rapid decline thereafter. This disagreement may be due partly to the inclusion of 100 day lactations in this study, while in the other work lactations of less than 200 days have been excluded.

The frequency of error larger than +5 % of the actual milk yield is one in 56, 168 and 9 for recording one day in every 7, 14 and 28 days respectively. From Table 2 it is clear that the frequency of this magnitude increases as milk yield decreases. The frequency of such error obtained in this study was less than that reported by Narayan *et al* (1957) for cows which was one in 12, 4 and 4 for recording once in 7, 14 and 21 days respectively.

Our results show that recording buffaloes on one day every four weeks throughout lactation gives an accurate estimation of milk yield for all practical purposes, as it differed only 2.47 % from daily recording. This magnitude of error will not cause a difference of more than 100 lbs. of milk as compared with daily recorded yields. This compares with 50 lb. from recording one day every week and approximately 40 lbs. for recording one day every two weeks for yields of 4000 lbs., which is the average production.

A scheme based on recording one day every four weeks could be undertaken at a comparatively low cost and with the minimum of effort by recorders and herd owners. This would allow an increase in the number of recorded buffalo cows, with obvious benefits to herd management and selection schemes, for example lactation yields included in this study range between 495 and 7098 lbs. Sidky (1955) has reported variations of 500 to 8500 lbs. As the policy of improving the buffalo production in this country depends on exploiting bulls with a high producing potentiality, the development of recording on private farms would help in increasing the number of proven bulls. At the present time all bulls used for improvement work are those produced on the few farms belonging to the Department of Animal Production or other official organisations, and the number produced is far below the needs of the country.

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## المخلص

### تقدير محصول لبن الجاموس بواسطة التسجيل على فترات مختلفة

شملت الدراسة ١٦٨ سجلا للحليب أنتجتها ٩٤ جاموسة في المدة من ١٩٥٤ - ١٩٥٧ ، واختبرت طرق تسجيل اللبن بواقع يوم كل أسبوع وأسبوعين وأربعة أسابيع وحسب مقدار الإرتباط بين السجلات المحسوبة وبين السجل الكامل كما قدرت الفروق بين هذه السجلات وبعضها والسجل الكامل بينها . وقد تبين من الدراسة أنه كلما كان إنتاج اللبن غزيراً كلما قلت الفروق بين السجلات المحسوبة على الأسس المختلفة سابقة الذكر وكلما قل إنتاج اللبن كلما زادت هذه الفروق .

وقد بلغت النسبة المئوية للخطأ ١,٢٢ ٪ ، ١,٥٦ ٪ ، ٢,٤٧ ٪ للسجلات المحسوبة على أساس مرة تسجيل واحدة كل ٧ ، ١٤ ، ٢٨ يوماً على التوالي بالنسبة للسجل الكامل . كما وجد أن متوسط الفرق بين التسجيل مرة كل أسبوع ومرة كل أربعة أسابيع أقل من ٥٠ رطلاً لمتوسط حليب قدره ٤٠٠٠ رطل .

وقد بلغ تكرار الخطأ الزائد عن ٥ ٪ من التسجيل الكامل مرة في كل ٥٦ ، ١٥٨ ، ٩ سجلات ، وذلك بالنسبة للتسجيل أسبوعياً وكل أسبوعين وكل أربعة أسابيع على التوالي . مما يشير إلى إمكان اتباع التسجيل مرة واحدة ليوم واحد كل أربعة أسابيع دون خطأ كبير مما يسمح أيضاً باستعماله لأغراض التربية والانتخاب عملياً .

