**The Determination of Total Lactation Milk Yields by Partial Milk Yields for Anatolian Water Buffalo**

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**Abstract**

 The study was aimed to determinate total lactation milk yields by partial milk yields for Anatolian water buffalo.

The relations between partial milk yields and total milk yields were researched with regression equations.

 Total lactation milk yield and partial milk yield were calculated by using daily milk yield in the water buffalo in Istanbul.

 In the study, daily milk yield records were used belonging to 150 water buffalo totally.

Animals were grouped with lactation numbers. As partial milk yield record, animals’ 15, 30, 45, 60, 90 and 120 days partial yields were used. In this study, the descriptive statistics of total lactation milk yield, daily milk yield and lactation period were found as 1622 kg, 7 kg and 233 day respectively.

The total lactation milk yields and uncompleted lactation milk yields can be predicted from partial milk yields by regression equation in short time. Finally, partial milk yields are used to forecast total milk yield in water buffalo.

**Keywords:** Regression Equations, Lactation Yield, Daily Milk Yield

 **Introduction**

Generally, study on lactation biometry of intensive water buffalo breeding in Turkey is lower than the other species.

The number of water buffalo is increasing in Asian continent, but in our country this situation is sharply decreasing until 2000 as 84000 head.

The number of water buffalo is increasing again. According to TUIK’s database, it was reported that total water buffalo number is 134.000 head (TUIK, 2015).

Water buffalo was raised in Samsun, Tokat, Amasya and Istanbul province of Turkey as nearly 44,000 head (TUIK, 2015).

Water buffalo’s products are valuable for milk and meat processing. For example, yogurt, kaymak and sausage made from buffalo milk and meat are very well-known and these products are preferred by consumers.

Specially, the fat percent of water buffalo’ milk is different from other species’ milk fat. Water, dry matter, fat and protein percentage in water buffalo milk have reported as 82 %, 18 %, 8 % and 4 % respectively (Soysal and Küçük, 1996).

In order to assess the genetic capacity of farm animal as quickly, milk yield of these animals should be estimated as early age as possible rather than waiting the whole lactation completed and accurately. Therefore, the partial milk yields are used to estimate the total lactation yields.

 The partial milk yields in the 10th week of lactation, were found more useful to estimate total lactation milk yield (Goodall and Sprague ,1985).

 **Materials and Methods**

  The animal material was constituted of 150 head Anatolian water buffalo raised in   Istanbul. Whole animals were reared in similar management and feeding conditions at private farm.

All animals were chosen same age groups (4-7 years).  On the other hand, 6 partial milk yield records were used as 15, 30, 45, 60, 90 and 120 days.

The correlation and regression analysis between total lactation milk yields with partial milk yields of the animals were determined and these relationships were compared with coefficient of determination (R2).

Partial milk yields and total milk yields were accepted as independent variable and dependent variable, respectively. Thereby, correlation and simple linear regression analysis methods were use in present study. The model with the highest coefficient of determination was identified as the most appropriate model (Soysal, 1993).

Parameter estimates of regression equations were calculated with Statistica package programme (Statistica, 1994).

 **Results and Discussions**

In present study, the average values for lactation period, total milk yield and daily milk yield were calculated 233 days, 1622 kg and 7 kg in animal, respectively.

At the same time, the mean of partial milk yields were shown for 15- 120 days in Table. 1.

 The correlation coefficients between total milk yield and partial milk yields were presented in Table 2.

 For instance, correlation coefficients of total milk yield with partial milk yields (30 days and 90 days) were calculated as 0.55 (P<0.01) and 0.76 (P<0.01) respectively. Also, the correlation coefficient between total milk yield and 120-day partial milk yield, has been found as (r=0.80\*\*).

The regression equations and determination coefficients were presented in Table 3. The regression lines and distributions were plotted between 15, 30. 45, 60, 90 and 120 days partial milk yields with total milk yield in Figure 1.

**Table 1.** The mean and standard deviations for partial milk yields, total milk yield and lactation length.

|  |  |  |
| --- | --- | --- |
|  | N |  Mean ± Standard Deviation |
| LL | 150 | 233,22 ± 52,54 |
| TMY | 150 | 1621,65 ± 530,0 |
| DMY | 150 | 6,95 ± 1,3 |
| 15 PMY | 150 | 108,07 ± 32,11 |
| 30 PMY | 150 | 234,40 ± 61,36 |
| 45 PMY | 150 | 365,12 ± 92,06 |
| 60 PMY  | 150 | 494,06± 124,6 |
| 90 PMY | 150 | 739,77± 186,9 |
| 120 PMY | 150 | 958,20± 236,6 |

 TMY: Total Milk Yield, LL: Lactation Length, DMY: Daily Milk Yield, PMY: Partial Milk Yield

**Table 2.** The correlation coefficients and significance test results (15-300 days) of partial milk yields and total milk yield

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 15 | 30 | 45 | 60 | 90 | 120 |
| 30 | 0,92\*\* |  |  |  |  |  |
| 45 | 0,86\*\* | 0,97\*\* |  |  |  |  |
| 60 | 0,80\*\* | 0,93\*\* | 0,98\*\* |  |  |  |
| 90 | 0,75\*\* | 0,89\*\* | 0,95\*\* | 0,98\*\* |  |  |
| 120 | 0,71\*\* | 0,85\*\* | 0,92\*\* | 0,96\*\* | 0,99\*\* |  |
| TMY | 0,37\*\* | 0,55\*\* | 0,65\*\* | 0,70\*\* | 0,76\*\* | 0,80\*\* |

\*: P<0.05, \*\*:P<0.01, TMY: Total Milk Yield

The relationships between total milk yield and partial milk yield were researched.

For example, The coefficient of determination was found as 49,5 % between total milk yield and partial milk yields of 60 days.

**Table 3.** Regression equations (Y = a + bX), and determination coefficients for 15-120 days (partial milk yields as independent variables and total milk yield values as dependent values).

|  |  |  |
| --- | --- | --- |
| Partial Yields According to Days | Regression Equation (Y=a+bX) | Coefficient of Determination (R2) % |
| TMY=a+b (15PMY)  | TMY=962+6,10 (15PMY) | 13,7 |
| TMY=a+b (30PMY) | TMY=498+4,79 (30PMY) | 30,8 |
| TMY=a+b (45PMY) | TMY=239+3,79 (45PMY) | 43,3 |
| TMY=a+b (60PMY) | TMY=143+2,99 (60PMY) | 49,5 |
| TMY=a+b (90PMY) | TMY=-15+2,17 (90PMY) | 58,7 |
| TMY=a+b (120PMY) | TMY=-110+1,81 (120PMY) | 65,1 |

b:regression coefficient, a: intercept, PMY: Partial Milk Yield

**Figure 1.** Distributions and the regression lines between 15, 30, 45, 60, 90 and 120 days partial milk yield with total milk yield.

Finally, this research was compared total milk yield by means of partial milk yields. Thus, partial milk yields are used to forecast total milk yield formerly in water buffalo.