

ESTIMATED MILK PRODUCTION OF 305 DAYS USING TEST DAY RECORDS AT BBPTU-SP BATURRADEN

Heni Indrijani
Fakultas Peternakan UNPAD

ABSTRACT

The research addressed to know the shape of lactation curve and correlation between actual milk production of 305 days with estimated milk production of 305 days using Ali-Schaeffer regression model which were approach by Test Day records system. The research had been conducted at Balai Besar Pembibitan Ternak Unggul Sapi Perah (BBPTU-SP) Baturraden, Purwokerto Central Java, and total data analysed were 348 Test Day records.

The result showed that the lactation curve of Ali-Schaeffer regression model of estimated milk production nearly close to actual lactation. That correlation with actual milk production equal to 0,983 and milk production of 305 days equal to 0,953. It can be concluded that test day records that combine with Ali-Schaeffer regression model can be used to estimate the mlk production of 305 days in dairy cattle with high correlation.

Key words: Dairy cattle Milk production, Test Day, Lactation Curve, Ali-Schaeffer Regression Model.

DUGAAN PRODUKSI SUSU 305 HARI BERDASARKAN CATATAN TEST DAY DI BBPTU-SP BATURRADEN

Heni Indrijani
Fakultas Peternakan Universitas Padjadjaran

ABSTRAK

Penelitian ini bertujuan untuk mengetahui bentuk kurva produksi susu dan korelasi antara produksi susu 305 hari sebenarnya dengan dugaan produksi susu 305 hari yang menggunakan pendekatan kurva persamaan Ali-Schaeffer berdasarkan pencatatan Test Day. Lokasi penelitian dilakukan di Balai Besar Pembibitan Ternak Unggul Sapi Perah (BPPTU-SP) Baturraden, Purwokerto Jawa Tengah dengan jumlah catatan Test Day yang digunakan dalam analisis sebanyak 348 catatan.

Hasil penelitian ini menunjukkan bahwa kurva produksi susu laktasi I dari model persamaan regresi Ali-Schaeffer hampir mendekati bentuk kurva produksi susu laktasi I sebenarnya. Nilai korelasi dengan produksi sebenarnya sebesar 0,983, dan produksi koreksi 305 hari sebesar 0,953 sehingga dapat disimpulkan bahwa catatan Test Day yang dikombinasikan dengan persamaan regresi Ali-Schaeffer, dapat digunakan untuk menduga produksi susu 305 hari sapi perah dengan ketepatan yang sangat tinggi.

Kata kunci: Sapi Perah, Produksi Susu, Test Day, Kurva Laktasi, Model Regresi Ali-Schaeffer.

Introduction

Selection for milk yield in dairy cattle is generally based on the analysis of 305 day lactation records. In order to estimate 305 day lactation yields, Test Day (TD) yields are generally recorded at monthly intervals. Incomplete lactation records are usually extended to 305 day records. The accuracy of 305 day yields depends on the number of TDs, the number of days between tests and the methods of estimating 305 day yields. Many scientists have described models for the analysis of TDs yields (24-h measurements) to estimate 305 day lactation yields (Kaya, *et al.*, 2003).

Many mathematical models, both linear and non-linear have been proposed to describe the shape of lactation curves. Previous work has used Wood and Wilmink regression to describe the shape of lactation. Comparisons of estimates and their prediction errors for milk yield, were made among models. The model using Ali-Schaeffer regression model had more advantage for comparison of prediction error variances of daily yield. The research addressed to know the shape of lactation curve and correlation between actual and milk yields of 305 days with estimated milk yields of 305 days using Ali-Schaeffer regression model which were approached by TDs records system.

Material and Methods

Total data analysed were 348 Test Day (TD) records and restricted to first lactations. TD records between 7 and 308 day during lactation period, and that TDs milk yield were formed to milk production standard of 305 day (milk std 305d). The research had been conducted at Balai Besar Pembibitan Ternak Unggul Sapi Perah (BBPTU-SP) Baturraden, Purwokerto Central Java. Regression models used to predict Milk yield std 305d was Ali-Schaeffer regression. The model was :

$$Y_t = a + b\left(\frac{t}{305}\right) + c\left(\frac{t}{305}\right)^2 + d \ln\left(\frac{305}{t}\right) + f \ln^2\left(\frac{305}{t}\right)$$

Where : Y_t = Test Day (TD) milk yields
 a, b, c, d, f = Coefficient regression
 t = Time (day)

Result

Comparison Between TD Milk Yields are given in Table 1 and also Figure 1. Actual milk yield and also milk yield production estimated by Ali-Schaeffer regression, peaked at around 28 DIM and then declined as lactation progressed, as reported by Indrijani (2001). The differences between actual milk yields and estimated by Ali-Schaeffer regression were very small. This was also true for the regression spline except for a small deviation at the middle of lactation periode. Correlation Between Milk Yields are presented in Tabel 2.

Tabel 1. Comparison Between TD Milk Yields

TD	Actual	Ali-Schaeffer	Differences
7	12.78	12.76	0.02
28	15.22	15.31	- 0.09
56	14.17	14.07	0.10
84	13.25	13.03	0.22
112	11.92	12.22	-0.30
140	11.59	11.52	0.39
168	10.71	10.83	-0.09
196	10.01	10.07	-0.06
224	9.37	9.21	0.16
252	8.33	8.20	0.13
280	7.50	7.38	0.12
308	6.62	6.53	0.09

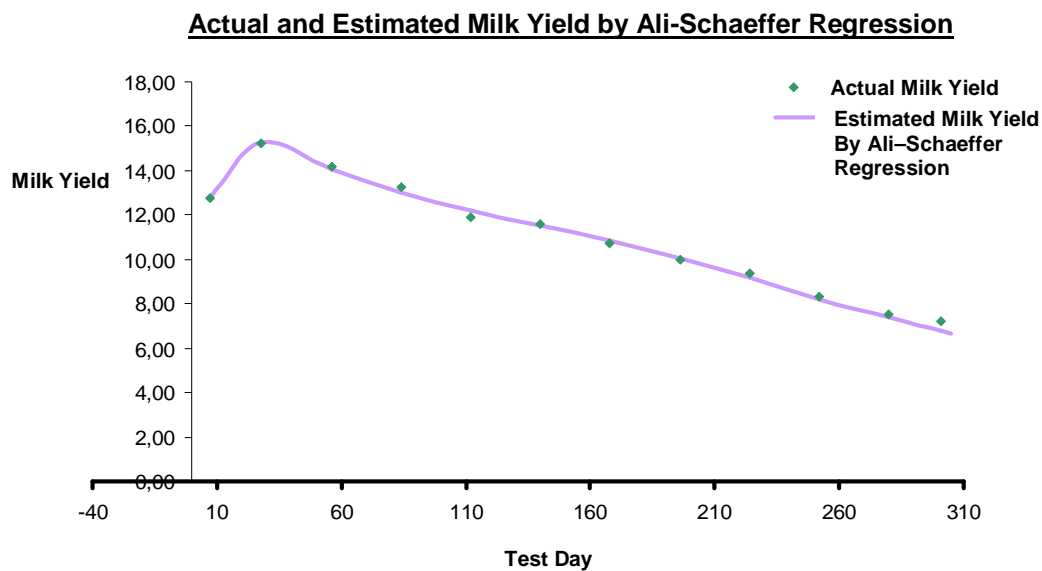


Figure 1. Milk Yield Curve

Tabel 2. Correlation Between Milk Yields

	Actual milk yield	Milk yield Std 305d	Milk yield A-S	Milk yield A-S Std 305d
Actual milk yield	1			
Milk yield std 305d	0,955	1		
Milk yield A-S	0,983	0,953	1	
Milk yield A-S Std 305d	0,971	0,955	0,986	1

The study of relationships between mathematical properties of functions used to model lactation curve is usually limited to the evaluation of the goodness of fit. Problems related to the existence of different lactation curve shapes. Ali-Schaeffer regression had five parameters, so it can be increased the flexibility to estimate a very large number of observation.

The correlation between actual, std 305d, and A-S milk yield were very high (0.953-0.986). This clearly explained why Ali-Schaeffer regression had the best fit. This suggest that TD milk yield which combined with A-S regression, could be use to estimate milk yield std 305d. These result were consistent with our previous studies on other places (Indrijani, 2008; Indrijani and Anang, 2002).

There are various advantages of using TD records, such as the fact that they do not have to be extended using a number of factors, and there is better modeling with TD records than 305 day ones, and more accurate to genetic evaluation (Ptak and Schaeffer, 1993; Swalve, 2000). Also, a smaller number of records may be as effective for genetic evaluation purposes as larger number of records and would allow for a reduction in computational time (Bignardi, *et al.*, 2006).

Conclusion

Ali-Schaeffer regression model have been suggested for genetic analysis of TD milk yields because of the ability to predict lactation curve for every animal with high correlation between predicted and actual milk production standard 305 day. Moreover, a compromise, often based on subjective grounds, must be accepted between goodness of fit and other properties such as great flexibility, sensitivity of the data, smoothness, robustness and computational considerations.

Acknowledgment

The author expressed her gratitude to Irwan Mahdyana, for his time spent as numerator. We are grateful to Asep Anang for valuable discussions and for sharing their programs.

Reference

- Ali, T.E. and L.R. Schaeffer. 1987. Accounting For Covariances Among Test Day Milk Yield In Dairy Cows. *Can. J. Anim. Sci.*, 67:637-644.
- Bignardi, A.B., L. El Faro, V.L. Cardoso, P.F. Machado, and L.G. Albuquerque. 2006. Estimation of Genetic Parameters for First Lactations Test Day Milk Yield of Holstein Cattle Using Random Regression Models. 8th WCGALP, CD-ROM Communication no. : 01-49.
- Indrijani, H. 2001. Penggunaan Catatan Test Day untuk Mengevaluasi Mutu Genetik Sapi Perah. Tesis Magister Sains. Program Pascasarjana IPB, Bogor.
- Indrijani, H. 2008. Penggunaan Catatan Produksi Susu 305 Hari Dan Catatan Produksi Susu Test Day (Hari Uji) Untuk Menduga Nilai Pemuliaan Produksi Susu Sapi Perah. Disertasi. Program Pascasarjana UNPAD, Bandung.
- Indrijani, H., dan A. Anang. 2002. Evaluasi Genetik Produksi Susu pada Sapi Perah dengan Model Regresi Tetap. *Jurnal Ilmu Ternak*, vol. I; 45-50
- Kaya, I., Y. Akbas, C. Uzmay. 2003. Estimation of Breeding Value for Dairy Cattle Using Test-Day Milk Yields. *Turk. J. Vet. Anim. Sci.* Vol 27: 459-464.
- Ptak, E., and L.R. Schaeffer. 1993. Use of Test Day Yields for Genetic Evaluation of Dairy Sires and Cows. *Livest. Prod. Sci.* Vol 34: 23-34.
- Swalve, H.H. 2000. Theoretical Basis and Computational Methods for Different Test-Day Genetic Evaluation Method. *J. Dairy Sci.* Vol 83: 1115-1124.