Italian Journal of Animal Science

ISSN: (Print) 1828-051X (Online) Journal homepage: https://www.tandfonline.com/loi/tjas20

An application of the integrative method for extending part lactation milk record in Mediterranean Italian buffalo reared in Caserta province

A. Zullo, C.M.A. Barone, L. Zicarelli & D. Matassino

To cite this article: A. Zullo, C.M.A. Barone, L. Zicarelli & D. Matassino (2007) An application of the integrative method for extending part lactation milk record in Mediterranean Italian buffalo reared in Caserta province, Italian Journal of Animal Science, 6:sup2, 417-420, DOI: 10.4081/ijas.2007.s2.417

To link to this article: https://doi.org/10.4081/ijas.2007.s2.417

An application of the integrative method for extending part lactation milk record in Mediterranean Italian buffalo reared in Caserta province

A. Zullo[1], C. M.A. Barone[1], L. Zicarelli[2], D. Matassino[3,4]

[1] Dipartimento di Scienze del Suolo, della Pianta, dell'Ambiente e delle Produzioni animali, Università degli Studi di Napoli Federico II, Portici (Napoli), Italy

[2] Dipartimento di Scienze zootecniche e Ispezione degli alimenti, Università degli Studi di Napoli Federico II, Napoli, Italy

[3] ConSDABI - NFP.I – FAO - Centro di Scienza Omica per la Qualità e per l'Eccellenza nutrizionali – Benevento, Italy

[4] Dipartimento di Scienze Biologiche e ambientali, Università del Sannio, Benevento, Italy

Corresponding author: A. Zullo, Dipartimento di scienze del suolo, della pianta, dell'ambiente e delle produzioni animali, Università degli Studi di Napoli Federico II, Via Università, 133, 80055 Portici (Napoli), Italy - Tel. 081-2539005 - Fax: 081-7762886 - Email: zullo@unina.it

ABSTRACT: This study was performed on 21,622 lactation of Mediterranean Italian dairy buffalo recorded by AIA with ICAR standard from 1992 to 1996 in Caserta province. The extending of lactation was performed using integrative methods (Pilla *et al.,* 1979), taking into account the effect of lactation number per day, calving order and month of calving. The results showed that the obtained coefficient was able to extending the lactation at 270 days with good approximation also beginning from a part –lactation of 90 days. In this case, the correlation coefficient between real and estimate milk yield varied from 0.91 to 0.93 in the considered groups. Moreover, the percentage of difference between real and estimated average milk yield is not over 5%.

Key words: Mediterranean Italian buffalo, Milk record, Extending lactation.

INTRODUCTION - The aim of the extending part-lactation is to predict the milk yield at 270 days of lactation. The advantage of this prediction concern of the buffalo cows classification on the basis of the same duration of lactation, when they have interrupt lactation for many causes. Another and most important reason is to anticipate the genetic evaluation of sire in progeny test employing also the daughters that haven't completed their lactation. Many proposed methods (Miller *et al.,* 1972; Pilla *et al.,* 1979; Shaeffer *et al.,* 1977; Van Vleck and Henderson, 1961) employed both non-linear function and models that estimate the residual production multiplying the production at the last control for suitable coefficients. About the buffalo cows, that has lactation curve well adaptable to Wood's model (1967) and high variable in relation of the reared province, of the year, the month and the order of calving (Zullo *et al*., 2001), it is suitable to test an extending part-lactation model through the coefficient estimation that consider the above mentioned factors. Moreover,

the number of milking per day has also been considered because in the Caserta province, in the observed years, many farmers carried out only one milking per day. In this work we employed the integrative method according to Pilla *et al.* (1979), but we intend to evaluate the effectiveness of further models on the basis of the other breeding provinces and of the last milk records.

MATERIAL AND METHODS - The research was carried out on milk yield data derived from milk records performed by AIA, according to ICAR standards, of buffalo cows reared in Caserta province in a 5-year period. Data set started with 21,622 lactations of 270 days from calving. If the lactation was less than 254 days, when the first control was carried out 75 days after calving and when distance between two controls was more of 75 days, data was not considered in the experimental plan. Moreover, lactations with aberrant data, due to transcription or digit error, were corrected or excluded. At last, for estimated coefficient, only the controls detected from calving to 300 days were considered. The remaining 8,697 lactations were distributed among the group: milking per day, calving order and month of calving (table 1). The calving order was grouped on the basis of lactation curves reported by Zullo *et al.* (2001). Real milk yield at 270 days was computed with Fleishman method for every group, as for as the coefficient for extending lactation: b1= regression coefficient of milk day production (y) on calving distance, starting by second control; b2= regression coefficient of milk day production on maximum production at control (z); b3= regression coefficient of b1 on z. The estimated milk yield at 270 days (Y_{270}) was computed summing to the partial milk production the amount estimated from the last control until to 270 days (Yr): Y_{270}=Y+Yr, where: Yr= (Ys+0.5 b d) d; Ys = p1+b2 [(z+b d1) - p1]; b = b1 + b3 (z – zm); zm = average of maximum production at control; d = 270 - d; d1 = calving distance of the last control, i.e. 30, 60, 90, 120, 150, 180, 210 and 240 days; p1= milk production of the last control.
To verify statistically the method of extending lactation, the correlation coefficient between real and estimate milk yield was calculated. Accordingly, a suitable SAS (1997) programme was set up both to select the milk records and to estimate the regression coefficient for the extending part of lactation.

RESULTS AND CONCLUSIONS - Obtained results show that, for all considered groups of calving order, month of calving and number of milking per day, the correlation coefficient between real and estimated milk yield starting by 240 days is always equal to 1.00 and highly significant (P<0.0001). The correlation coefficient for 210 (r=0.99÷1.00), 180 (r=0.98÷0.99), 150 (r=0.96÷0.97), 120 (r=0.94÷0,96) and 90 days (r=0.91÷0.93) is also high and significant (table 1). These results indicate that the employed method is adapt to extend part-lactation of buffalo cows which have interrupt their lactation also at 90 days, with a correlation coefficient over 0.90.
Table 2 shows the high differences among calving orders and milking per day for real milk yields and the differences between real milk yield and the estimated one. If the extending of lactation starts from 240 days, the difference between real and estimate milk yield is less than 1.00%. This percentage tends to increase as soon as the days of partial production decrease, but it isn't over 5%, also when the estimation begin from 90 days. Higher differences observed with increased milking frequency should further be investigate.

Table 1. Number of lactation (N) and correlation coefficient (average of twelve months) between milk yield at 270 days and estimated milk yield to start a partial production.

Calving order	N	Partial production days from starting to extend lactation at 270 days							
		30	60	90	120	150	180	210	240
		1. One milking per day							
1	549	0.81	0.87	0.92	0.95	0.97	0.98	0.99	1.00
2	303	0.85	0.90	0.93	0.96	0.97	0.99	0.99	1.00
3-4-5	501	0.83	0.88	0.92	0.95	0.97	0.98	0.99	1.00
6-7	235	0.80	0.89	0.92	0.96	0.97	0.98	0.99	1.00
≥ 8	422	0.80	0.87	0.93	0.96	0.97	0.99	1.00	1.00
		2. Two milking per day							
1	1,853	0.83	0.88	0.92	0.94	0.96	0.98	0.99	1.00
2	1,468	0.81	0.87	0.91	0.94	0.97	0.98	0.99	1.00
3-4-5	2,232	0.84	0.89	0.92	0.95	0.97	0.98	0.99	1.00
6-7	628	0.79	0.86	0.91	0.94	0.96	0.98	0.99	1.00
≥ 8	506	0.83	0.89	0.93	0.95	0.97	0.98	0.99	1.00

All the correlation coefficient are significant for $P<0.0001$.

Table 2. Average of real milk yield production at 270 days (average of twelve months) and its difference percentage with estimated milk yield to start a partial production.

Calving order	Real milk yield 270 days, kg	Partial production days from starting to extend lactation at 270 days							
		30	60	90	120	150	180	210	240
		1. One milking per day							
1	1439.02	4.97	2.39	1.32	0.97	0.84	0.71	0.44	0.23
2	1756.63	6.52	3.70	2.59	2.18	1.94	1.61	1.11	0.56
3-4-5	1826.03	7.06	3.85	2.77	2.64	2.24	1.92	1.26	0.63
6-7	1776.24	8.42	4.93	3.25	2.94	2.49	2.12	1.30	0.62
≥ 8	1642.03	7.71	3.90	2.78	2.26	2.04	1.73	1.12	0.59
		2. Two milking per day							
1	2004.26	10.08	6.68	4.93	4.09	3.21	2.31	1.44	0.69
2	2329.59	10.20	6.20	4.54	3.74	3.10	2.31	1.47	0.72
3-4-5	2374.11	10.44	6.46	4.88	4.14	3.50	2.71	1.75	0.83
6-7	2256.63	11.61	7.32	5.31	4.48	3.65	2.75	1.80	0.87
≥ 8	2091.39	9.40	5.42	3.84	3.24	2.85	2.20	1.50	0.72

These results highlight that the integrative method for extending part-lactation in Mediterranean Italian buffaloes gives a good prevision of the milk yield production at 270 days, also beginning from a partial production of 90 days. Taking into account of genetic and environmental progress in the buffalo breeding, it is important to precise that the estimated coefficient for extending part-lactation should be made periodically, on the basis of recent milk records.

REFERENCES - **Miller** R.M., Pearson R.E., Fohrman M.H., Creegan M.E. (1972). Methods of projecting complete lactation production from part-lactation yield. J. Dairy Sci., 55, 199-203. **Pilla** A.M., Nardone A., Aleandri R. (1979). Un nuovo metodo per la previsione della produzione della lattazione standard di 305 giorni a partire da produzioni parziali. Ann. Ist. Sper. Zootec., 12 (2), 125-143. **SAS**, 1997. User's guide. 6.12 version. Cary, NC, USA: SAS Institute Inc. **Shaeffer** L.R., Minder C.E., Mc Millan I., Burneide E.B. (1977). Non linear techniques for predicting 305-day lactation production of Holsteins and Jerseys. J. Dairy Sci., 60, 1636-1644. **Van Vleck** L.D., Henderson C.R. (1961). Extending part lactation òilk records by regression ignoring herd effects. J. Dairy Sci., 44, 1519. **Wood** P.D.F. (1967). Algebric model of the lactation in cattle. Nature, 216, 164. **Zullo** A., Barone C.M.A., Colatruglio P., Occidente M., Troisi M., Matassino D. (2001). Primo contributo alla conoscenza dell'effetto di alcuni fattori ambientali sulla galattopoiesi individuale di bufale allevate in Italia e sottoposte ai controlli funzionali. Atti 1 Congr. Naz. sull'Allevamento del Bufalo. Eboli 3-5 ottobre, 322-326.