



DAIRY SCIENCE 2007

Meeting the challenges for pasture-based dairying

Predictive characteristics of lactation models for pasture-based Holstein Friesian dairy COWS

S.A. Adediran¹, J.R. Roche^{1,2}, D.J. Donaghy^{1,2}, R.P. Rawnsley^{1,2}, M. Freeman^{1,2}, P. Nish³, and A.E.O. Malau-Aduli¹

¹University of Tasmania, Private Bag 54 Hobart, TAS 7001, Australia.

²Tasmanian Institute of Agricultural Research, P.O. Box 3523, Burnie, TAS 7320

³Tas Herd, Hadspen, Tasmania

Contact: Samuel.Adediran@utas.edu.au





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Models tested

1. Incomplete Gamma (IG)

$$Y(t) = at^b e^{-ct} \quad (\text{Wood, 1967})$$

2. Modified Gamma (MG)

$$Y(t) = ate^{-ct} \quad (\text{Jenkins \& Ferrel, 1984})$$

3. Mixed Log (ML)

$$Y(t) = a+bt^{1/2} + c \log t \quad (\text{Guo \& Swalve, 1995})$$

4. Exponential (EXP)

$$Y(t) = a+be^{-kt} + ct \quad (\text{Wilmlink, 1995})$$

5. Polynomial (PR)

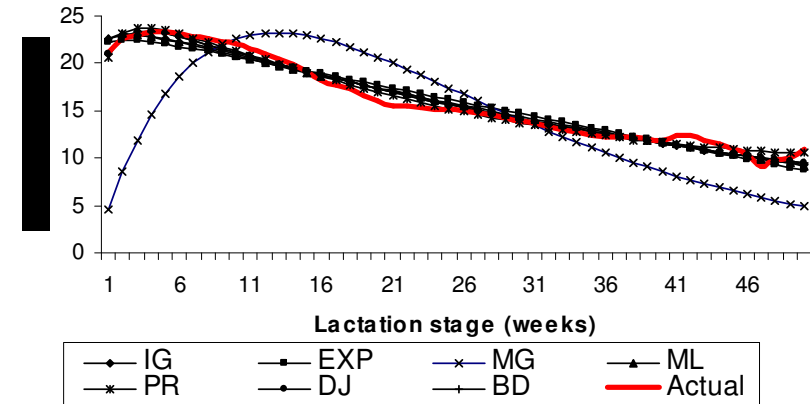
$$Y(t) = a+bt+ct^2 + d \log t + \varepsilon (\log t)^2 \quad (\text{Ali \& Schaeffer, 1987})$$

6. Bicompartmental (BC)

$$Y(t) = ae^{-bt} + de^{-ct} \quad (\text{Ferguson \& Boston, 1993})$$

7. Dijkstra (DJ)

$$Y(t) = a \exp[b(1-e^{-ct})/c-dt] \quad (\text{Dijkstra et al., 1997})$$



Actual and predicted herd milk yield profile (DATA1) of pasture-based Holstein-Friesian dairy cows fitted to different lactation functions.

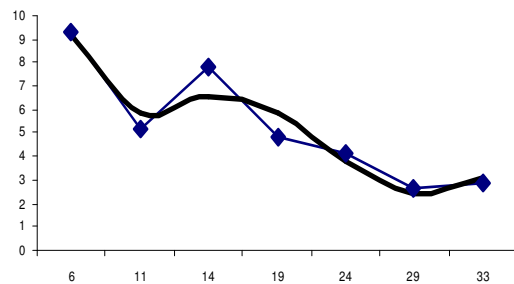
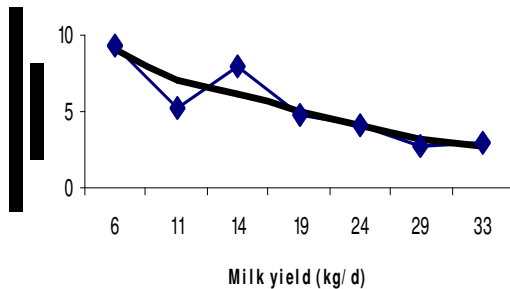
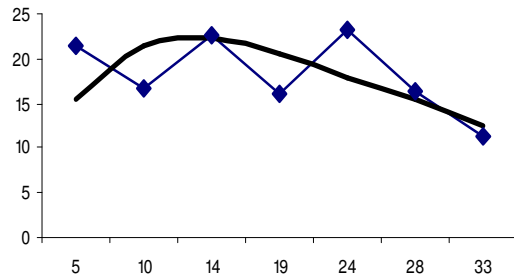
Item	Actual	Predicted		
		IG	Lactation model PR	DJ
Initial	21.1	22.7	20.6	21.0
Peak	23.4	22.8	23.7	23.4
Mid	15.0	15.5	15.0	15.4
Final	10.9	9.34	10.9	10.9
Pk Wk	4	4	4	4
RMS		0.66	0.31	0.47



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Individual cow lactations



Conclusions and future work

Take home message

- The best overall model for fitting either herd or individual cow data was the PR model
- Best 3 parameter models (Wood's IG and Guo and Swalve's ML)
- The mechanistic models performed best in fitting herd production

Future work

- Evaluate the models on milk composition (fats and protein)
- Identify the factors defining different shapes in individual pasture-based cows
- Evaluate the accuracy of lactation models in fitting body weight and BCS of pasture-based lactating COWS