Milk production quantity model evaluation in saddle horse Anglo-Arabian type lactating mares

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Introduction

Estimating mare's milk production is a stake for the equine sector. This part of the equine industry has been developping itself around mare's milk (human food and cosmetics) and foals' growth which is directly linked to the disponibility of mare's milk. During the first two months of his life, the foal's diet is mainly consisted of milk. Thus, identifying the variation factors of the milk production will allow a better understanding about mare's needs during the lactation and the foal's growth.

Materials & methods

- Years of studies: 2016-2018
- Unique sample day on 5 points of lactation

- **97** mares, sport and leisure AA horses
- **40** Primiparous (5 to 6 years old) et **57** Multiparous (6 to 14 years old)

T0 — Muzzle puts on the foal

+ 3h — First milking (M1)
=> estimator of the maximal capacity of the mare's udder

+ 30' — **Second milking (M2)**
=> represents **potentially** the quantity of milk ingested by the foal during one suckle

+ 30' — **Weight-Suckle-Weight (WSW)**
=> estimates the **real** quantity of milk ingested by the foal during one suckle

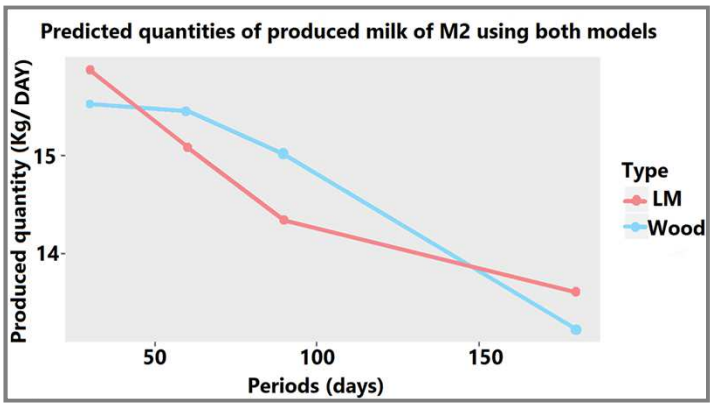
- Two models have been used: Wood's model and a Linear Mixed-Effects model (LME)

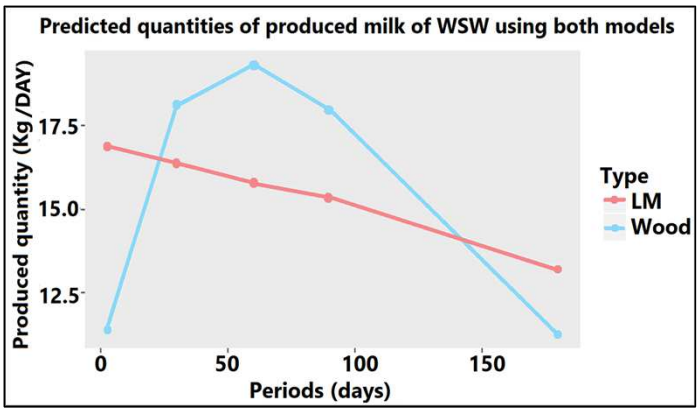
Wood's model (*Wood, 1967*) is defined by $Y_t = at^b e^{-ct}$

y : milk production (Kg) at time t, **a** : initial milk yield, **b**: rate of increase until the peak is reached , **c** : rate of decline after peak production, **e**: Neper number

LME model is defined by **Y= aX+biZ+e**

y : target variable, **a** : fixed effect coefficients, **X** : fixed effect features, **bi** : random effect coefficients, **Z** : random effect features, **e** : residual errors





	M2	WSW
AIC Wood	2 652,6	3 885,9
AIC LME	2 537,5	3 893
Target variables	- Produced quantity	- Consumed quantity
Fixed effects	- mare's Live weight - Parity - Period (days) - Milking 1	- Season - Period (days)
Random effects	- Individuals	- Individuals

Conclusion

- According to the comparative analysis of both models, we can conclude that the Linear Mixed-Effects model is a better estimator than Wood's model. (Santos et *al.* 2007 & Centoducati et *al.*, 2012)
- As well, we can conclude that M2 is a better estimator for mare's milk production.
- WSW may be considered as a estimation of foal's milk ration. (Gibbs et *al.* 1982)

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