

## NOTA BREVE

### FIRST LACTATION CURVE MODEL IN CANARY GOATS

#### MODELO DE CURVA DE PRIMERA LACTACION EN CABRAS CANARIAS

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#### Additional Keywords

Mathematics function. Milk production. Dairy goats.

#### Palabras clave adicionales

Funcion matemática. Producción de leche. Cabras lecheras.

#### SUMMARY

The weekly milk yield of 72 canary goat breeding group raised on the experimental farm of the Centro de Investigación y Tecnología Agraria (Tenerife. Canary Islands) was recorded. All does were in their first lactation and were selected from the most representative local farms. During the control day does were hand milked once a day starting one week after kidding until the 32<sup>nd</sup> week of lactation.

Milk yield increased from 2.4 kg in the first control to milk yield peak (2.5 kg) in the fourth week, then decreased gradually and it was found that at the 32<sup>nd</sup> week the milk yield was 1.4 kg.

To fit our data the function proposed by Cooby and Le Du (1978) had the smaller error mean square.

$$y = a (1 - e^{-bx}) - cx$$

#### RESUMEN

Han sido controladas las producciones de 72

cabras de la Agrupación Caprina Canaria mantenidas en condiciones experimentales en el Centro de Investigación y Tecnología Agraria (Tenerife. Islas Canarias). Todas las cabras se encontraban en su primera lactación y fueron seleccionadas en las granjas más representativas de las islas. Durante el control las cabras fueron ordeñadas a mano una vez al día, comenzando una semana después del parto hasta la 32 semana de lactación.

La producción se incrementó de 2,4 kg en el primer control hasta alcanzar el pico de producción (2,5 kg) en la cuarta semana, entonces decreció gradualmente hasta de 1,4 kg en el control de la semana 32.

Con el ajuste de nuestros datos a diversas funciones, el modelo propuesto por Cooby y Le Du (1978) ofreció el valor más pequeño del cuadrado medio residual.

#### INTRODUCTION

The term lactation curve refers to the

graphical representation of the relationship between milk yield and length of time since calving (Papajcsik and Boderó, 1988).

Knowledge of this allows prediction of total milk yield from a single test day (Wood, 1974), and is a valuable tool for dairy producers, management decision making and selection (Gipson and Grossman, 1990).

In general the lactation curve of goats and particularly that of the Canary goat population, has not been well studied.

Most of the studies are made using the mathematical functions that have been described for cows, considering that the evolution of milk yield in goats is similar to that of cattle (Larson, 1978; Wiggans, 1986). Goats reach the peak of their lactation between 2 to 10 weeks after kidding (Gall, 1981), other authors show later periods between 8 to 12 weeks (Sands and McDowell, 1978).

The present work aimed at identifying the lactation curve of the Canary goat population from an experimental herd of animals in their first lactation.

## MATERIAL AND METHODS

Data were collected from 72 Canary goats raised in the Animal Production Department of the Centro de Investigación y Tecnología Agraria de Canarias (C.I.T.A.).

All the animals were selected from the most representative local farms from the different islands. After the suckling period they were breed together in our farm. The first kidding was in April 1989 and kids were separated

from their mothers three days after.

Milk production was recorded at weekly intervals starting one week after kidding until the 32<sup>nd</sup> week of lactation.

On the day of milk recording, does were milked once a day. Milk was weighed on scales (+/- 0.1 kg).

The mathematical functions were fitted with the statistical program SAS (1982) using the PROC N LIN which gives the parameters of the curve and an analysis of variance of the regression to determine the residual variance. We have studied the following mathematical functions:

1.- The simple lineal regression model (Madalena *et al.* 1979).

$$y = a - bx$$

2.- The quadratic model (Dave, 1971).

$$y = a + bx - cx^2$$

3.- Cobby and Le Du's model (1978).

$$y = a (1 - e^{-bx}) - cx.$$

4.- Wood's model (1967).

$$y = ax^b \exp(-cx)$$

Where x represents the length of time since kidding in weeks and a, b and c, are the parameters of the curves.

## RESULTS AND DISCUSSION

The initial milk yield was  $2.41 \pm 0.86$  kg, the peak of lactation was reached in the 4<sup>th</sup> week of lactation as has been

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**Table 1.** Estimate of Parameters and Error Mean Square (E.M.S.) of the Equation Studied. (Estimación de los parámetros y cuadrado del error medio de la ecuación estudiada).

Equation	a	b	c	E.M.S.
$y=a+bx$	2.78	-0.006	0.3806	
$y=a+bx+cx^2$	2.71	-0.004	-0.00001	0.3801
$y=a(1-e^{-bx})-cx$	2.81	0.38	0.006	0.3798
$y=ax^b e^{-cx}$	2.31	0.07	0.004	0.3805

reported for other spanish autochthonous goat breeds Herrera *et al.*, 1985) and for the autochthonous breed from Chile (Pérez *et al.*, 1990). This is not a well defined maximum because there is a flat zone in the 2<sup>nd</sup> ( $2.46 \pm 0.81$ ), 3<sup>rd</sup> ( $2.49 \pm 0.83$ ) and 4<sup>th</sup> control ( $2.50 \pm 0.85$ ). After this period a slight decrease in milk yield was observed until the 7<sup>th</sup> week, after which another flat zone was found until the 14<sup>th</sup> control after which milk yield decreased until the last control

( $1.37 \pm 0.5$  kg).

Table I shows the different adjustments obtained for the mathematical functions studied. Using the reduction of the mean square of error as comparative criteria (Papajcsik and Boderó, 1988) the equation that gives the closest result in the model proposed by Cobby and Le Du (1978), which is together with Wood's model (1967) one of the most widely used (Elston *et al.*, 1989).

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