THE MEASURE OF MILK RABBIT

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ABSTRACT

Records from 643 lactations were used to predict the production of 28 days from daily milk measures. Increasing from 1 to 5 measures per week the correlation coefficients and standar errors improved from 91.9 to 99.3, and from 11.2 to 3.3 g/day respectively. A 3-day weekly sample seems to be adequate in most situations (R^2 = 98.2%, RSE = 5.2) seems a suitable method for most purposes. Considering litter weight as a variable, the prediction was for 28 days clearly unsatisfactory and for 21 days was equivalent to that obtained with one measure of milk per week.

Key words: milk yield, estimation.

INTRODUCTION

The milk yield of doe rabbits is closely related to some physiological and reproductive variables, as corporal condition, fecundity, survival of litters and weaning weight. For these reasons is often measured in experimental works, although sometimes is estimated through the liveweight of litters, because the correlation between both variables is very high, especially at 21 days of age (DE BLAS and GÁLVEZ, 1973).

The difference found between the weight of the doe after and before suckling, which implies a tedious and time consuming daily work for the whole lactation, is normally use to measure the milk. LEBAS (1968), with the breed “Fauve de Bourgogne” estudied the error of the method in several hipothesis when the estimation was carried out only in some of the days of the lactation period. At the present time New Zealand breed and its crosses are the breeds currently used, reproductive animals have been genetically improved and perhaps it would be sensible to re-examine the problem, having in mind that nowadays a substantial amount of data on lactation has been eventually recorded by the experimental groups involved in rabbit science.

In the present experiment records from New Zealand x Californian (synthetic line) lactations, obtained in our farm with the difference method and using a digital balance with a 5-grams scale, will be used to predict the production of milk through several measures of daily production

MATERIAL AND METHODS

Data

We have joined a relevant part of records of milk production, where number of parturition, remating interval, weight of mothers, and size and weight of litters were included, obtained under several conditions from New Zealand x California doe rabbits in some experimental works performed in our farm, especially in the last years (SABATER *et al*., 1993; PASCUAL *et al*.., 1999; QUEVEDO, 2004), examining 943 lactations of 28 days. There is a report of the data so far examined in Table 1, where it can be seen the great range of values. Milk output for the whole period was 209 g / day, far higher than the figures published by DE BLAS and GÁLVEZ (1973) for "Gigante de España", a non-selected breed, and by LEBAS (1973) for the breed "Fauve de Bourgogne". The main frecuency for 28-days milk output (650 lactations) was 220-260 g/day as an average, although there were about 60 lactations with less than 140 g/day.

Table 1. Experimental data from 943 lactations

		mean	min-max
Milk yield (g/day):	1-7 days	150.4	24-249
	8-14 days		
	15-21 days	253	53-370
	22-28 days	207	20-355
	1-21 days	210	44-308
	1-28 days	209	46-306
Litter weight (kg)	21 days	3.08	0.21-4.55
	28 days	4.71	0.28-7.14

Statistical analysis

Regresion analysis were carried out relating production of milk at 21 and 28 days of lactation to daily milk grouped in several ways. A model accounting for fixed effects of parity order, actual remating interval and their interactions was used. All results presented on the tables are given as Least Square Means. Simple regression equations have been obtained applying the STATGRAPHICS PLUS (1990) system.

RESULTS AND DISCUSIÓN

Milk has been calculated as the sum of weekly values, which in turn were predicted from one or more daily values of that week. The milk output was significantly lower both the two first and two last days of the 28-day period; and the regression between daily and weekly values showed that coefficients of correlation (R^2) varied between 70 and 80, and the standar error (RSE) between 16 and 32, although they tended to be lower for the days in the middle of the week. Based on these reasons it was decided not to

include the first two days of each week to predict the production of milk for 21 (L0-21) and 28 days (L). In the resulting analysis, taking only one value per week, the standar error was 11.2, which represents that 95% of the actual values varied from the predicted ones in about 16 g/day. When including more days, the correlation and the standar error improved: some of the regression equations are given in Table 2. As we could expect the accuracy increases whith the number of data, reaching a reliable prediction when 3 values per week were introduced in the analysis. In this case the true value should have a maximum error of about 20 grams per day, a relatively low figure.

As a consecuence, the method to be chosen will depend on considering the purpose of the work or the error allowed in each case. Similar equations were obtained for milk yield during the first 21 days, but the correspondant errors are higher than before (12.3, 7.8, 5.9, 7.3, 3.6 for 1,2 3 4,5 measures per week respectively).

Table 2. prediction for 28-days milk yield (L, g/day)

Measures per week	Regression equations	R^2 (%)	RSE
1	L = 21.08 + 0.90 * X	91.9	11.2
2	L = 11.05 + 0.85 * X	96.5	7.3
3	L = 5.97 + 0.95 * X	98.2	5.2
4	L = 3.75 + 0.96 * X	98.9	4.1
5	L = 1.03 + 0.97 * X	99.3	3.3

*x is the average of daily milk measures throughout the whole period

Introducing the weight of litters in a multiple regresion equation did not increase the accuracy of the prediction. When some especific weights were removed from the analysis (i.e weight at 28 days < 2 kg and / or >6 kg) the results did not vary appreciably. Considering litter weight as a variable the predicting equations were for 21 days L= -9.16+71.1*weigth (R^2=91.7, RSE=11.5, where L is expressed in g/day and weight of litters at 21 days in kg) and for 28 days L= 19.6 + 40.2*weight (R^2=72.2, RSE=20.7). The prediction for 28 days is clearly unsatisfactory, but for 21 days is more acceptable and equivalent to that obtained with one measure of milk per week. This different response has been reported by De Blas and Gálvez (1973) that found for a 21-day period a correlation coefficient R^2 = 81, whereas it was considerably lower (R^2 = 25) for 35 days. SABATER *et al.* (1993) reported the same tendency, but the accuracy was similar in both periods (R^2 =77 and 75; and RSE 0.66 and 0.70 for the 21-day and 28-day period respectively.

Some authors (SABATER *et al*., 1993; DE BLAS and GÁLVEZ, 1973) have calculated the relationship between milk output and the size of litter, but the prediction is lower than that obtained in the present work with 1 measure per week. Other variables to be considered were the order of parity and rematig interval, because they affect very often to milk productión and consecuently its estimation might be affected. The analyses showed that neither remating interval nor parity order affected signifantly to the error of the estimation in the hipothesis so far considered, with the exception of the “5-measures

per week"; however the RSE value was very similar for lactations in both situations, simultaneous or not simultaneous pregnancy (3.41 or 3.44).

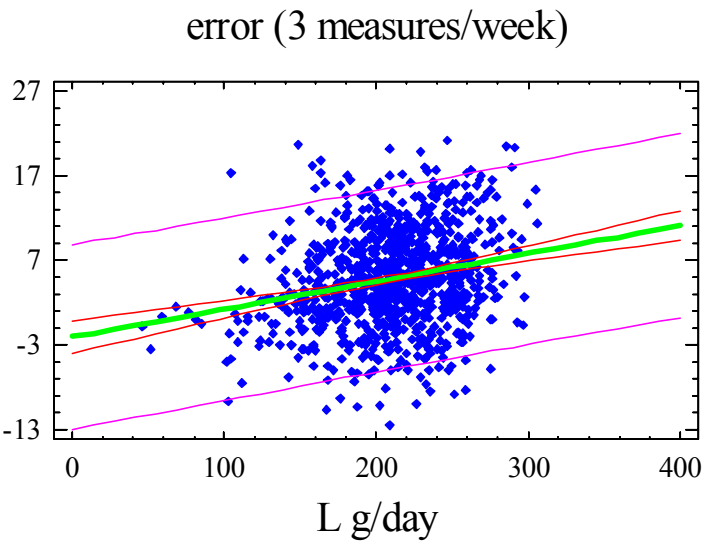

Figure 1. The relationship between the error (g/day) and the 28-day milk predicted with 3 measures per week

CONCLUSIONS

The results above mentioned confirm that to predict milk yield the best method is to consider some values of daily milk, depending of the precission that in each case is required, but a 3-day weekly sample seems to be adequate in most situations.

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