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SIMPLIFIED ESTIMATION FORMULA OF THE MILK PRODUCTION IN SHEEP

FORMULĂ SIMPLIFICATĂ DE CALCUL A PRODUCȚIEI DE LAPTE LA OAIE

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The paper proposes a simplified formula to estimate the milk production in sheep. The formula is based on using the polynomial of Hermite interpolation of 0 degree. The result constitutes a control value for the milk production parameter. This value is well correlated with the correctly calculated value by a polynomial interpolation of superior degree.
Key words: milk, milking curve, sheep.

Introduction

In special conditions, a faster estimation method of milk production is needed, without owning programmable calculation tools. Sometimes, for more or less argumented reasons, the beneficiary manifests distrust against the parameters calculated by sophisticated estimation methods. We propose an expeditious, easy but approximate method for estimating the milk production in sheep.

Methodology and Discussions

The method is based on the estimation methods of the surface integral. Starting from the finding that the milk production is equal with the value of the surface integral in the graph of the daily milk quantity reported in time, this production can be calculated by the formula:

Equation 1:

$$M.P. = \left(0.5 \times a_0 \times h + a_1 \times h + a_2 \times h + ...a_{n-1} \times h + 0.5 \times a_n \times h\right), \text{ where}$$

M.P. - represents the total milk production;
$a_0, a_1, a_2,...a_i...a_n$ - are the daily milk quantities;
h – is the time interval among milking controls.

But $a_0 = 0$ and $a_n = 0$. It results that the formula becomes:

Equation 2:

$$Milk\ \Pr oduction \approx h \times \sum_{i=1}^{n-1} a_i \ ,$$

or in a more general expression:

Equation 3:

$$Milk\ \Pr oduction \approx \Lambda + h \times \sum_{i=1}^{n-1} a_i \ , \text{ where}$$

Λ - is the time interval between the date of the first milking control and the lambing date.

This value can be considered constant in the case of synchronized lambings. ***The correlation between the value of milk production calculated by this formula and the value of milk production correctly calculated by the cubic spline interpolation formula is 0.99.*** The number of liberty degrees for which the correlation was calculated was equal with 400.

Let us exemplify the expeditious calculation method with the following example (tab. 1). Let us propose that we have the following data:

Table 1

Primary data

No. control	0	1	2	3	4	5	6	7
Control data	24.02	09.03	24.03	9.04	24.04	09.05	24.05	09.06
Factor	2	2.1	2.3	2.5	2.4	2.3	2.2	2
Milk quantity (ml)	0	100	120	150	160	100	60	0

The data of the previous table allow achieving the next table (tab. 2):

Table 2

Primary data

Time (days)	0	15	30	45	60	75	90	105
Milk quantity (ml)	0	210	275	375	384	230	132	0

It results that the milk production, estimated by the simplified formula, is 1606 x 15 = 24090, therefore approximately 24 litres. The correct value is 24.7 litres. If the time interval among milking controls is 30 days, a double value results. The question is how correct the result is. The answer is that it is about only an approximate enough estimation. The cause can be a passing-by of milk production from the first milking interval (whose size is not 15 days) and the fact that the time interval among milking controls is not always 15 days. So, the approximation is in minus. The value offered by formula is informative only and it has the role to provide a value that to be near to the real value, but the advantage of this method is the remarkable simplicity of calculation. The formula is based on the trapeze method for the calculation of surface integrals (the Simpson method). Graphically transposed, it is near to the below figure. This graph is the essence of the actual method to calculate the milk production (fig. 1). It can be considered the constant spline method, of 0 degree (the constant Hermite polynomial).

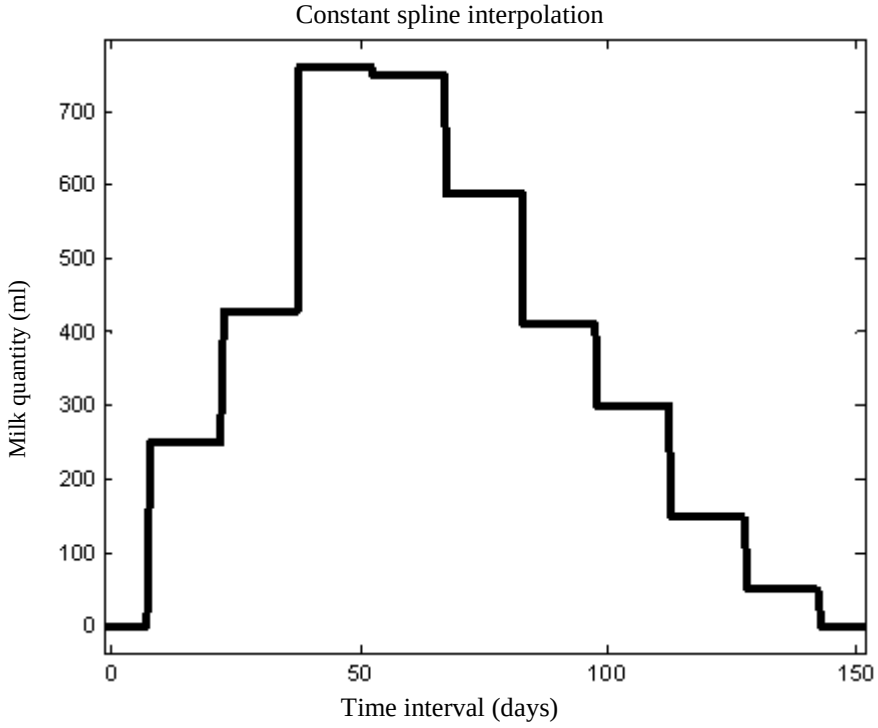

Figure 1. The calculation base for simplified formula (the constant interpolation)

The previous figure suggests the utilization manner of the simplified formula. The method can be used for achieving a control value for milk production.

Conclusions

1. The estimation formula of the milk production in sheep, based on the Hermite polynomial of degree 0, approximates well the correct value of this parameter.

2. The method provides a control value for this production parameter.

3. Because it is very simple, the proposed formula can be used in estimations which are not based on the computerizing calculation.

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