

## Renewed estimation method for 24-hour fat percentage in AM/PM milk recording scheme



R.M.G. Roelofs, G. de Jong and A.P.W. de Roos

NRS is een onderdeel van CRV Holding BV

## Background

- AM/PM milk recording in The Netherlands
  - ▶ alternating collection
  - ▶ Peeters and Galesloot, 2002

$$24h-fat\% = b_0 + b_1 * fat\%(n) + b_2 * prot\%(n) + b_3 * milk(n) + b_4 * int(n) + b_5 * milk(n-1) + b_6 * int(n-1) + e$$

- Farmers experience fluctuations in fat percentage

## Deviation

- Preliminary results:
  - ▶ a.m.-sample: -0.09%
  - ▶ p.m.-sample: 0.05%
- Possible origin deviation:
  - ▶ fluctuations in milk-fat syntheses between AM-PM
    - Gilbert *et al.* (1972) and Lee and Wardorp (1984)
  - ▶ lactation stage and parity
    - Liu *et al.* (2000)

## Objective

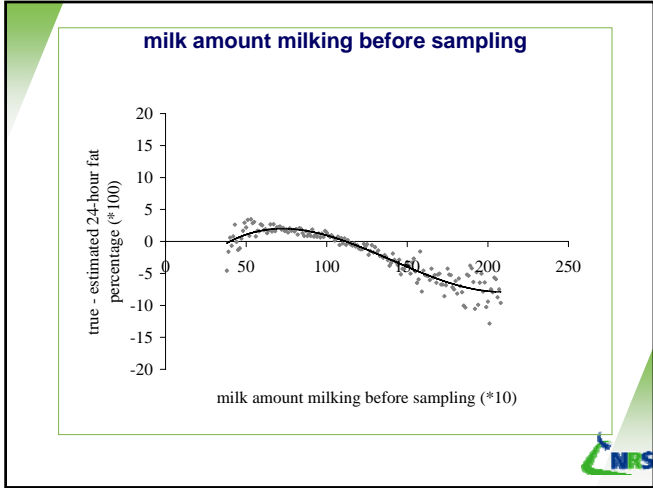
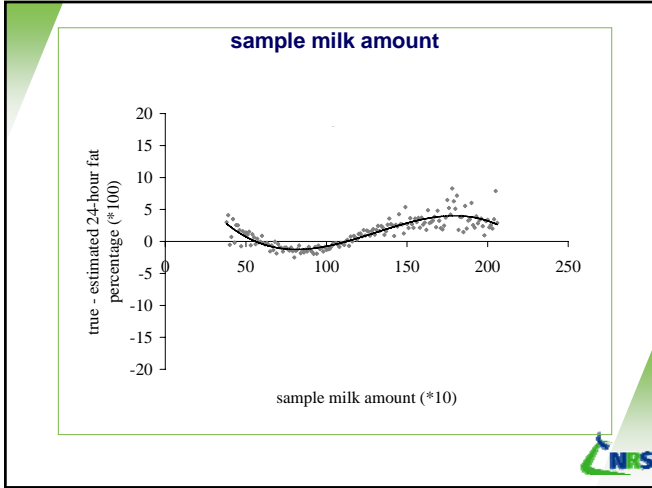
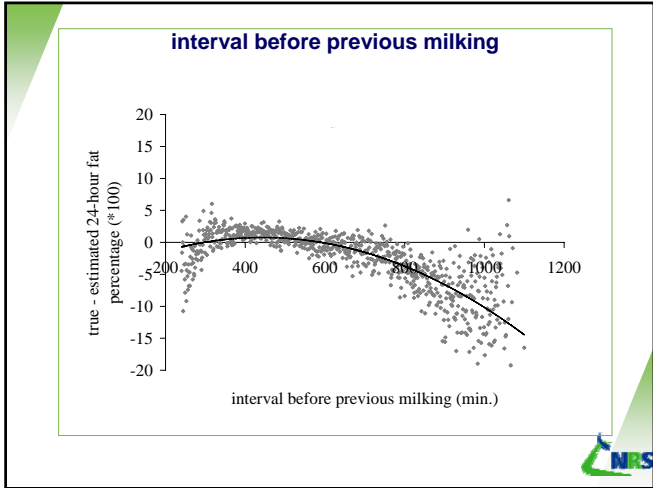
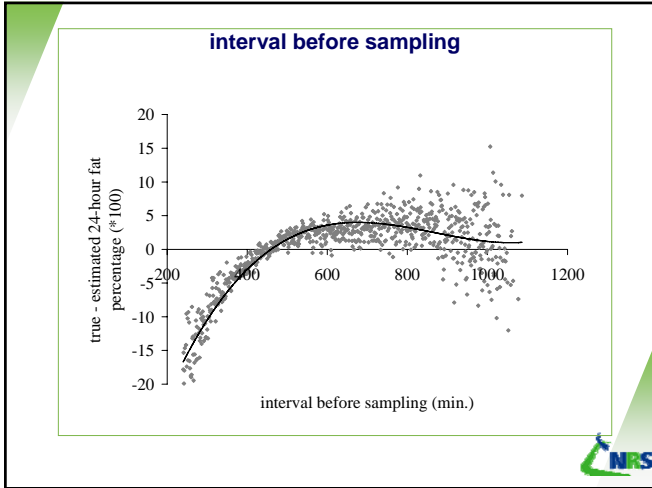
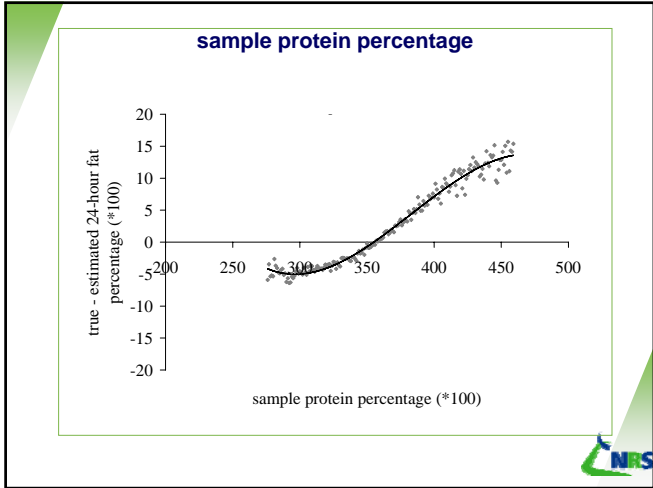
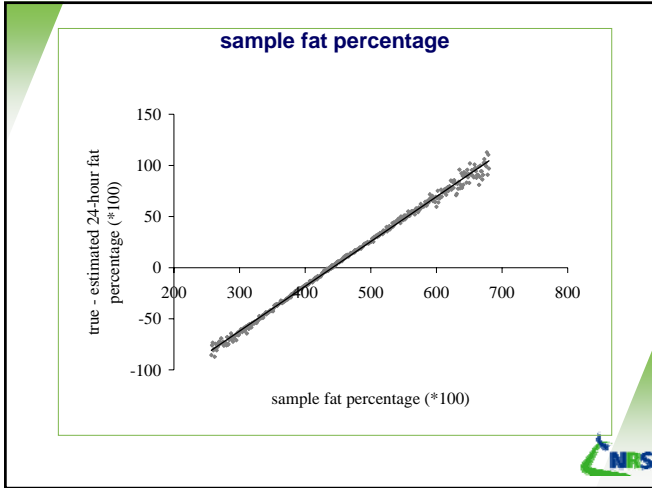
- Increasing the accuracy of the estimated 24-hour fat percentage by testing for non-linearity of current effects and introducing new explanatory variables

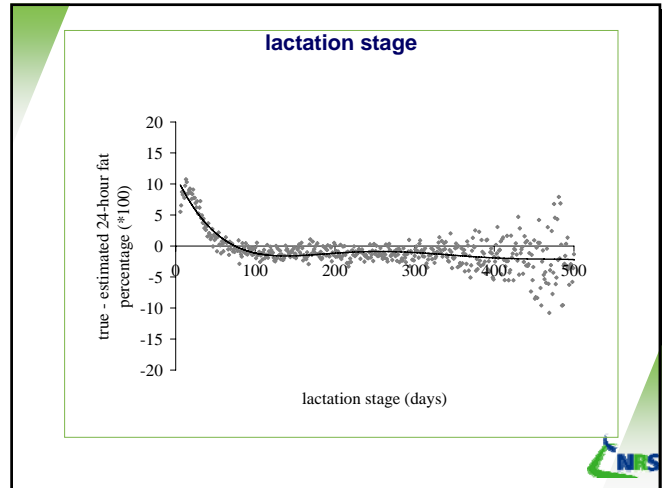
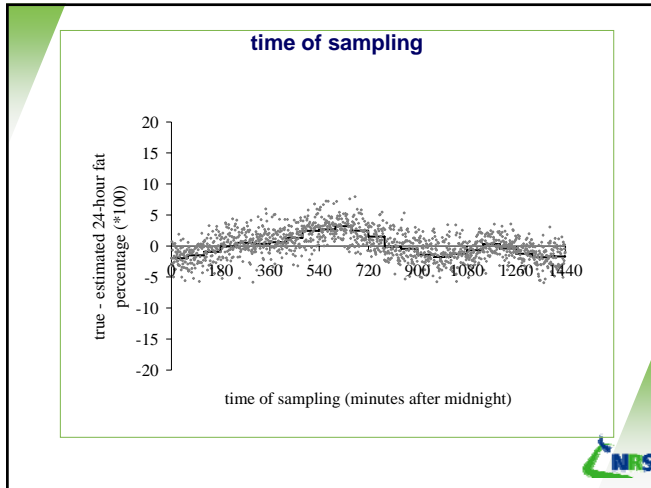
## Material

- Data of farms using Automatic Milking System
- January 20<sup>th</sup> 2001 - July 1<sup>st</sup> 2004
- Cows with 2 samplings per test day
- Data split in 2 datasets per cow-test day
  - ▶ Dataset 1: estimation
  - ▶ Dataset 2: validation
- |               | Dataset 1 | Dataset 2 |
|---------------|-----------|-----------|
| ▶ # samplings | 371.528   | 371.885   |
| ▶ # cows      | 50.591    | 50.643    |
| ▶ # farms     | 537       | 538       |

## Methods

- Subsequently adding changes to the regression
  - ▶ non-linearity of current effects
  - ▶ new explanatory variables
    - time of sampling
    - lactation stage
    - parity
    - month of milk sampling
- Monitoring the accuracy of the estimated 24-hour fat percentage
  - ▶ st.dev of the difference true-estimated
  - ▶ correlation between true-estimated
  - ▶ b-factor (slope of linear regression true-estimated)





### parity and month of sampling (\*100)

Parity	Estimate	Month of sampling	Estimate
1	-6.58	January	0.24
2	-3.56	February	0.28
3	-1.42	March	0.54
4	-0.48	April	-0.27
5	-0.35	May	-2.07
6	-0.35	June	-3.36
7+	-0.00	July	-4.32
		August	-5.52
		September	-4.74
		October	-2.24
		November	-0.97
		December	-0.00

### Accuracy of regression

- Difference between true-estimated 24-hour fat %

Regression	St.Dev.	Corr.	b-factor
Current, re-estimated	0.2856	0.898	0.807
Non-linearity	0.2820	0.901	0.812
Time of sampling	0.2817	0.901	0.813
Lactation stage	0.2803	0.902	0.814
Parity	0.2794	0.903	0.816
Month of sampling	0.2788	0.903	0.817

- reduction in st.dev. of difference is 2.4%
- correlation increases from 0.898 to 0.903
- b-factor increases from 0.807 to 0.817

### Validation AM/PM milk recording

- Preliminary results:
  - ▶ a.m.-sample: -0.09%
  - ▶ p.m.-sample: 0.05%
- Current regression formula
  - ▶ a.m.-sample: -0.00%
  - ▶ p.m.-sample: 0.01%

### Conclusions

- Improvement of Peeters and Galesloot, 2002

$$24h-fat\% = b_0 + b_1 * fat\%(n) + pol(prot\%(n), 3) + pol(milk(n), 3) + pol(int(n), 3) + pol(milk(n-1), 3) + pol(int(n-1), 2) + time\ of\ sampling(n) + pol(lactation\ stage(n), 3) + parity(n) + month\ of\ sampling(n) + e$$