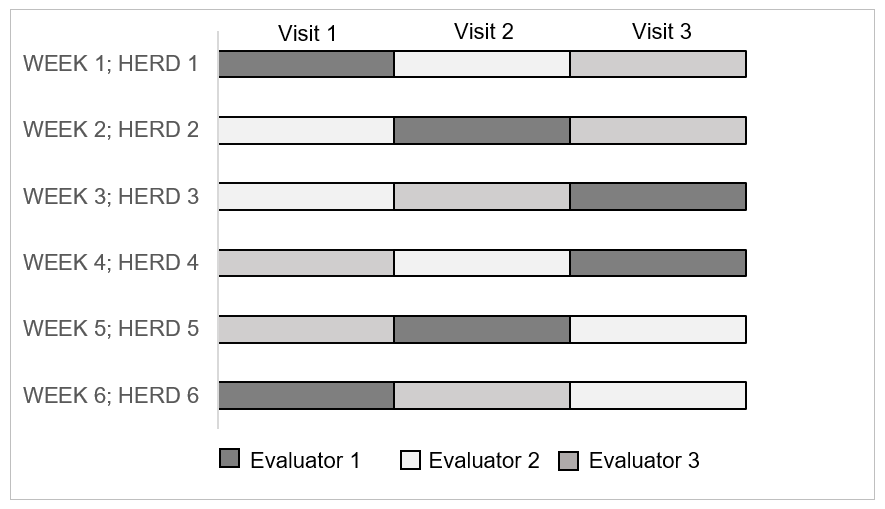
**Evaluation of three methods to assess the degree of milk-out in dairy cows**

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**Supplementary material for *animal* journal**

**Supplementary Figure S1** Randomised temporal organisation of the three evaluators when assessing completeness of milk-out in German Holstein dairy cow herd 1 to 6. All dairy herds were visited once by each evaluator

**Supplementary Table S1** Characteristics of six German Holstein dairy cow herds, parlours and parlour settings at the six dairy farms included in the evaluation of completeness of milk-out

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Farm | | | | | |
|  | A | B | C | D | E | F |
| Herd characteristics |  |  |  |  |  |  |
| Herd size | 198 | 81 | 390 | 194 | 140 | 303 |
| Mean lactation number | 2.3 | 2.2 | 2.6 | 1.3 | 1.6 | 2.1 |
| Parlour types and technical settings |  |  |  |  |  |  |
| Milking parlour type | parallel | auto-tandem | parallel | herringbone | herringbone | herringbone |
| Size of milking parlour | 2x12 | 2x4 | 2x20 | 2x12 | 2x8 | 2x8 |
| Operating vacuum setting (kPa) | 42 | 37 | 44 | 43 | 37 | 43 |
| Pulsation ratio | 60:40 | 60:40 | 60:40 | 65:35 | 60:40 | 60:40 |
| Pulsation rate (cycles/min) | 60 | 60 | 60 | 60 | 60 | 58 |
| Automatic cluster remover setting (ml/min) | 300 | 300 | 480 | 300 | 250 | 750 |
| Delay times (s) | 25 |  | 25 | 30 | 30 | 20 |
| Mean vacuum level at the teat end  during ongoing milk flow (kPa) 1 | - | 34.4  (n = 32) | 35.1  (n = 44) | 37.6  (n = 32) | 36.7  (n = 28) | - |

1 Vacuum measurements conducted in July and August 2017

**Supplementary Material S1** Logistic and linear regression model description

A logistic regression model was fitted to analyse the relationship between the outcome of the visual scoring of the degree of quarter filling (**VISUAL)** (target) and the herd, the evaluators and the strip yield in 60 s (**SY60**) (predictors). A linear regression model was introduced to analyse the relationship between the outcome of the precisely defined hand milking method **(DEFINED)** (target) and the method of quantitative assessment of number of easy strips (**EASYSTRIPS**) (target) and the herd, the evaluators and SY60 (predictors). The models were defined as

Where

is the outcome of the assessment of the cow’s quarters with the VISUAL, the DEFINED or the EASYSTRIPS method

is the intercept

is the effect of the herd

is the effect of the evaluator

is the effect of SY60

is the random error for the model

**Supplementary Material S2** Exemplary R Code of the linear regression model for the method of quantitative assessment of number of easy strips (**EASYSTRIPS**)

lmEASYSTRIPS <- lme(EASYSTRIPS ~ SY60 + herd + evaluator, data=data1, random=~1|ID, na.action=na.exclude, weights=varIdent(form=~1|herd\*evaluator), method="ML", control=list(maxIter=255,msMaxIter=255,opt="nlminb"))

anova(lmEASYSTRIPS)

summary(lmEASYSTRIPS)