# Dairy workability trait group report

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## Introduction

The importance of functional traits in dairy cattle breeding, particularly workability (Work), has increased considerably in recent years. The workability trait group, as evaluated at Interbull Centre, comprises of two specific traits: Milking Speed (MS) and Temperament (TEM). Although these traits do not directly impact milk yield, they enhance the profitability of milk production by reducing associated costs (Szymik et al., 2021). Furthermore, workability traits are becoming especially important in herds with automatic milking systems (AMS). Some studies have reported that very fast milking cows may face a higher risk of health issues such as subclinical or clinical mastitis (Zwald et al., 2006) and these fast milking rates are also associated with elevated somatic cell counts in their milk (Rupp and Boichard, 1999). Therefore, selecting cows with intermediate milking speed is recommended.

MSP can be defined as the cow's ability to milk in a short time, while TEM is the cow's behaviour and ease of handling during milking (Sewalem et al., 2011). Other important functional group trait includes milkability, such as average milk flow rate (AMF), and maximum milk flow rate (MMF), both measured in kilograms per minute (Kg/min) along with the milking time. An additional workability trait measured in some countries is the leakage, which refers to milk dripping or flowing from one or more teats. This report focuses on two specific traits related to this trait group: MSP and TEM, but other terms or additional traits used from some European countries at the national level also have been considered here (Table 1).

This report consolidates information about workability traits from eight EU member countries and three non-member countries for the workability trait group. Data was sourced from "Workability form" available on Performance Recording, Evaluation and Publication database (PREPdb) (Interbull Centre 2025). This approach aimed to compare national-level information on aspects such as trait definitions, measurement/recording scales, lactation stages of the recorded animals and the evaluation models used by each country within Europe. The aim of gathering and comparing of such information, is to identify possibilities for standardization and harmonization of workability traits' data.

***Breeds evaluated for the workability traits***

Many European countries involved in the international evaluations offered by Interbull do have a national evaluation in place for workability traits for some breeds although not all of them might send the trait to be evaluated in a given international evaluation (cases reported in *italics*).

Holstein (HOL) appears to be the breed where such genetic evaluation is mostly applied for workability traits, involving participants from nine EU countries: France (FRA), Slovenia (SVN), Poland (POL), the Netherlands (NLD), Italy (ITA), and in Germany, Austria, and Luxembourg (DEU). Additionally, three non-EU countries of Switzerland (CHE), Norway (NOR) and the United Kingdom (GBR) have also evaluated workability traits at the national level, as shown in Table 1. Brown Swiss (BSW) ranked second, with evaluations conducted in five EU countries: SVN, NLD, ITA, FRA, Germany and Austria (DEA), along with one non-EU country (CHE). Red Dairy Cattle (RDC) have been assessed in NOR and in Denmark, Finland, and Sweden (DFS), as well as in DEU and NLD, which includes both the Dutch and Flemish regions. The Jersey (JER) breed has only been evaluated in DFS, NLD, and CHE. Lastly, *Simmental (SIM)* has been evaluated exclusively in *NLD* and *DEA* and only at national level.

***Trait definition and recording scale***

Examining workability traits across European countries revealed both similarities and differences in their definitions and measurements. Certain countries have defined other definitions of workability related traits at the national level which such cases have been presented in *italics*. In NOR, the workability trait group also includes "*leakage*", which is the dripping or flowing milk between milking. Farmers have subjectively scored this leakage on a three-point scale (Table 1). In ITA and for BSW breed, there have been two additional traits related to workability: "*milkability*", where cows are evaluated subjectively on a linear scale, and "*milk flow/leakage*," measured by herd automatic milk meters in kg/min. Finally, in DEU, milkability has been evaluated subjectively during milking using a five-point linear scale (Table 1).

Most countries have used subjective evaluation systems that employ linear scales to assess milking speed, although the range of these scales varies. For instance, SVN and POL utilized a five-point scale (1-5; very slow to very fast), CHE employed a six-point scale (1-6;

very slow to very fast), while FRA and the joint evaluation system of DFS used a nine-point scale (1-9; very slow to very fast) (Table 1). The NLD has also established a nine-point linear scale applicable to all breeds, and the GBR has utilized a similar nine-point scale for "ease of milking" ranging from very slow to vary fast. In contrast, NOR employed a simplified three-point scale (1-3; fast to slow) for RDC population. Italy has presented a unique approach by applying a binary trait system (slow/not slow) for HOL cattle (Table 1).

Some countries have adopted more objective methods for measuring milking speed. For instance, using electronic flow meters, the ITA for BSW cattle and DEU for HOL and RDC cattle assessed milking speed in kg/min (Table 1). In contrast, DEA has applied a combination of objective (kg/min) and subjective (five-point scale) measurements in their evaluation system. For example, they have used measures in regions such as Austria, Baden-Württemberg, and Bavaria, while subjective measures have been used in some areas of Austria (Table 1).

Regarding temperament traits, there is greater consistency in the basic definition, as most European countries have evaluated/assessed the cow's behaviour during milking (Table 2). However, the measurement scales differed significantly. POL and NOR have used a three-point scale, FRA has employed a five-point scale, while the NLD, GBR, DFS, and DEU have adopted a nine-point scale (Table 2). CHE has stood out by using a binary scale (1 or 2) specifically for HOL cattle (Table 2). Although the fundamental trait definitions have been remained similar across countries, variations exist in terminology and scale endpoints. Several countries distinctly determined their scale as ranging from "vicious to placid". However, countries like POL and NOR defined the temperament as easy, average and uneasy (Table 2). The GBR evaluation system seemed unique as it included both "behaviour during milking" and "ease of handling" in its temperament assessment but also ranging from vicious to placid (Table 2).

***Statistical models and parity/lactation of recorded animals***

The evaluation models used for workability traits varied across European countries. SVN, NOR, DFS and CHE have applied single-trait- best linear unbiased prediction- animal models (ST BLUP AM), for their respective breeds, while ITA for Holstein has used a single-trait repeatability test-day animal model (ST TD RP AM) with records from first parity (Table 1 and 2). Multi-trait BLUP animal models (MT BLUP AM) have been implemented in several countries. POL has utilized this approach for Holstein cattle, while NLD applied it across multiple breeds (Holstein, Brown Swiss, Jersey, Simmental, and Red Dairy Cattle) with records

from first parity. NLD has evaluated a MT model considering $MSP_{NLD}$ (milking speed Netherlands), $MSP_{FLA}$ (milking speed Flanders), $TEM_{NLD}$ (temperament Netherlands) and $TEM_{FLA}$ (temperament Flanders) y (Table 1 and 2). The GBR similarly employed MT BLUP AM for Holstein evaluations but lactation-based recording y (Table 1 and 2). FRA utilized MT BLUP AM and notably evaluated workability traits together with conformation traits. This has been done for both HOL and BSW breeds, with recordings from parities 1 and 2, but only one record per cow. ITA for BSW with records from first parity and DEU for HOL and RDC cattle based on first lactation record used a multi-trait repeatability animal model (MT RP AM), while DEA applied a multi-trait test-day model y (Table 1 and 2).

Table 1. Country, Breeds, trait definition, recording scale, evaluation model and lactation /parity for traits related to milking speed in European countries.

| **Country** | **Breeds** | **Trait definition[a]** | **Recording scale** | **Evaluation model[b]** | **Parity/lactation of recorded animals** |
|---|---|---|---|---|---|
| **Milking speed related traits** | | | | | |
| CHE* | JER, HOL, BSW | Cows subjectively evaluated during milking on a linear scale | Linear scale of 1 to 6 (very slow – very fast) | ST BLUP AM Evaluated with conformation traits | 1st parity |
| DEA | SIM, BSW | From milking speed recording (stop watch) | Kg/min | MT TD AM | 1st lactation |
| | BSW | Cows subjectively evaluated during milking on a linear scale | Linear scale of 1 to 6 (very slow – very fast) | | |
| DEU | HOL, RDC | Milkability consists of information from measured milk flow rate | Kg/min | MT RP AM MT: MFR, MSS, TEM, FTP, FTL | 1st lactation |
| | | ***Milkability: Cows evaluated subjectively during milking*** | Linear scale of 1 to 5 | | |
| DFS | RDC, JER | Cows subjectively evaluated during milking | Linear scale of 1 to 9 (slow – fast) | ST BLUP AM | 1st parity |

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| | | on a linear score | | | |
| FRA | HOL, BSW | Cows evaluated subjectively during milking on a linear score | Linear scale of 1 to 9 (slow - fast) | MT BLUP AM MT: Evaluated with conformation traits | Parities 1 and 2, one score per cow |
| GBR* | HOL | Ease of milking | Linear scale of 1 to 9 (slow – fast) | MT BLUP AM | 1st lactation |
| ITA | HOL | The cows identified as below average in milking speed are coded as "slow", the others "not slow | Binary trait coded as slow or not slow | ST RP TD AM | 1st parity |
| ITA | BSW | ***Milk flow recorded by electronically flow meters*** | Kg/min | MT RP TD AM | Parities 1, 2 and 3 |
| | | ***Milkability: Cows evaluated subjectively during milking on a linear scale*** | Linear score | | |
| NLD | HOL, BSW, JER, SIM, RDC | Cows evaluated subjectively during milking on a linear scale | Linear scale of 1 to 9 (slow – fast) | MT BLUP AM MT: $MS_{NLD}$, $TEMP_{NLD}$, $MS_{FLA}$, $TEMP_{FLA}$ | 1st parity |
| NOR* | RDC | Cows subjectively evaluated during milking on a linear scale | Linear scale of 1 to 3 (fast – slow) | ST BLUP AM | 1st parity |
| | | ***Leakage: is dripping or flowing of milk between the milking's*** | Scored by the farmer at 3 level scale (1=none, 2=a little, 3=obvious) | | |
| POL | HOL | Cows subjectively evaluated | Linear scale of 1 to 5 (very slow – very fast) | MT BLUP AM | 1st parity |

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| | | during milking on a linear scale | | | |
| SVN | HOL, BSW | Cows subjectively evaluated during milking on a linear scale | Linear scale of 1 to 5 (very slow - very fast) | ST BLUP AM | 1st parity |

*: Non-EU countries

[a] =Traits in bold and *italics* are extra traits that have been collected and evaluated by the countries at the national level.

[b] = Abbreviations: AM=Animal Model, ST=Single Trait, MT= Multi Trait, SB= Single Breed, BLUP= Best Linear Unbiased Prediction, REP= Repeatability, TD = Test day Model. $MSP_{NLD}$ = milking speed Netherlands, $MSP_{FLA}$ = milking speed Flanders, $TEM_{NLD}$ = temperament Netherlands, $TEM_{FLA}$ = temperament Flanders, MFR = milk flow rate, MSS = milking speed score, TEM = temperament, FTP = teat placement front, FTL = teat length, CONF = conformation traits.

Table 2. Country, Breeds, trait definition, recording scale, evaluation model and lactation parity/lactation for traits related to Temperament in European countries.

| **Country** | **Breeds** | **Trait Definition** | **Recording scale** | **Evaluation model[b]** | **Parity/lactation of recorded animals** |
|---|---|---|---|---|---|
| **Temperament** | | | | | |
| CHE* | HOL | Cows subjectively evaluated during milking on a linear scale | Linear scale of 1 to 2 (nervous – calm) | ST BLUP AM | 1st parity |
| DEU | HOL, RDC | Cows subjectively evaluated during milking on a linear scale | Linear scale of 1 to 9 (vicious – placid) | MT RP AM MT: MFR, MSS, TEM, FTP, FTL | 1st lactation |
| DFS | RDC, JER | Cows subjectively evaluated during milking on a linear scale | Linear scale of 1 to 9 (vicious – placid) | ST BLUP AM | 1st parity |
| FRA | HOL, BSW | Cow's behaviour during milking | Linear scale of 1 to 5 | MT BLUP AM MT: Evaluated with conformation traits | Parities 1 and 2, only one record per animal |
| GBR* | HOL | Cow's behaviour during milking | Linear scale of 1 to 9 (vicious – placid) | MT BLUP AM | 1st lactation |

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|---|---|---|---|---|---|
| NLD | HOL, BSW, JER, SIM, RDC | Cow's behaviour during milking | Linear scale of 1 to 9 (vicious – placid) | MT BLUP AM MT: $MS_{NLD}$, $TEMP_{NLD}$, $MS_{FLA}$, $TEMP_{FLA}$ | 1st lactation |
| NOR* | RDC | Cows subjectively evaluated during milking on a linear scale | Linear scale of 1 to 3 (easy, average, uneasy) | ST BLUP AM | 1st parity |
| POL | HOL | Cows subjectively evaluated during milking | Linear scale of 1 to 3 (easy, average, uneasy) | MT BLUP AM | 1st parity |

*: Non-EU countries

[b] = Abbreviations: AM=Animal Model, ST=Single Trait, MT= Multi Trait, SB= Single Breed, BLUP= Best Linear Unbiased Prediction, REP= Repeatability, TD = Test day Model. $MSP_{NLD}$ = milking speed Netherlands, $MSP_{FLA}$ = milking speed Flanders, $TEM_{NLD}$ = temperament Netherlands, $TEM_{FLA}$ = temperament Flanders, MFR = milk flow rate, MSS = milking speed score, TEM = temperament, FTP = teat placement front, FTL = teat length, CONF = conformation traits.

## *Conclusion*

Most European countries have established standardized traits, definitions, and recording systems for evaluating workability traits, primarily focusing on milking speed and temperament although some countries have used different definition or extra traits. However, there are significant differences in the evaluation methods and models used across these countries. The overarching goal is to harmonize these traits and evaluation methods across countries through PREPdb. This effort will lead to more accurate genetic predictions and enhance correlations between countries in Interbull international evaluations. Standardizing such traits and information for workability traits is essential for improving the reliability and comparability of evaluations within the European dairy cattle population.

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