

**Country**

**France**

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**Trait category:**

**Individual trait(s):**

**Workability  
Conformation**

**Milking speed  
Udder  
Locomotion  
Other**

**Computing and methodology:**

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## FRANCE

Workability traits	Milking speed	
Breed(s)	[H] [M] [N]	Holstein Montbeliarde Normande
Trait definition and unit(s) of measuring	[H,M,N]	Scored on a linear 1-5 point scale from slow (1) to fast (5)
Method of measuring and collecting data	[H,M,N]	Scored by farmer collected by classifier
Time period for data inclusion	[H] [M] [N]	Since 1986 Since 1988 Since 1982
Age groups	[H,M]  [N]	1 <sup>st</sup> or 2 <sup>nd</sup> lactation (if there is no record in 1 <sup>st</sup> lactation)  1 <sup>st</sup> or 2 <sup>nd</sup> lactation, all cows of widely used proven bulls, with milk production index INEL > 25 points (for connections only)
Genetic parameters	[H] [M]  [N]	$h^2_{\text{milking speed}} = 0.32$ $h^2_{\text{milking speed}} = 0.19$ $r_{g(\text{milking speed, udder traits})} = -0.31 \text{ to } 0.44$ $h^2_{\text{milking speed}} = 0.20$
Sire categories	[H,M] [N]	All bulls AI-test bulls
Environmental effects pre-adjustment evaluation model	[H,M,N] [H] [M] [N]	None Within region x year: age at calving x parity, stage of lactation x parity, visit (day x herd x classifier) Within region x year: age at calving, stage of lactation, visit (day x herd x classifier) Within region: semester x year, body condition at scoring, age at calving x parity, herd milk production level class, stage of lactation, classifier
Base for age adjustment	[H,M,N]	None
Use of genetic groups and/or relationships	[H,M] [N]	According to sex, birth year x country of origin, status (AI, NS) for bulls, region for cows For unknown maternal grand sires, according to birth year
Method (model) of genetic evaluation	[H] [M]  [N]	ST BLUP AM MT BLUP AM, evaluated together with udder traits ST BLUP Sire-MGS model
System validation	[H,M,N]	-
Expression of proof	[H] [M] [N]	RBV with M = 0 and SD = 1, higher values indicates faster milking RBV with standardized M = 100 and SD = 12, higher values indicate faster milking RBV with M = 50, phenotypic SD = 10, higher values indicate faster milking

**Workability traits****Milking speed***continued*

<b>Genetic (reference) base</b>	[H,M]	Rolling average of sires with REL $\geq$ 0.70, with known pedigree and progeny tested in France, born between 7 to 10 years before actual year
	[N]	Rolling average of sires born between year 7 to 10 years before actual year, having $\geq$ 20 progeny test daughters
<b>Criteria for official publication of sire proofs</b>	[H,M,N]	REL $\geq$ 0.70
<b>Number of evaluations/publications per year</b>	[H]	Two; June, December
	[M]	One; July
	[N]	Two; March, June
<b>Use in total merit index</b>	[H]	<u>ISU:</u> $100 + 26.85 \{ (0.7 \times \text{INEL}) / 20 + 0.25 \times \text{type composition} + 0.05 \times \text{milking speed} \}$ <u>Udder composite:</u> $0.45 \times \text{udder cleft} + 0.55 \times \text{udder-hock distance} + 0.10 \times \text{udder balance} + 0.15 \times \text{teat placement front} - 0.10 \times \text{teat direction rear}$ <u>Rump composite:</u> $(\text{rump length} + \text{width at hips} + \text{rump angle}) / 3$ <u>Body composite:</u> $0.25 (\text{height at sacrum} + 2 \times \text{chest depth} + \text{width at hips})$ <u>Type composite:</u> $0.60 \times \text{udder composite} + 0.20 \times \text{body composite} + 0.10 \times \text{rump composite} - 0.10 \times \text{rear leg set}$
	[M]	<u>ISU:</u> $100 + 25.40 \{ (0.66 \times \text{INEL}) / 20 + 0.28 \times (\text{type composite} - 100) / 12 + 0.06 \times (\text{milking speed} - 100) / 12 \}$ <u>Beef composite:</u> $0.50 \times \text{withers} + 0.50 \times \text{thighs}$ <u>Body composite:</u> $0.30 \times \text{height at sacrum} + 0.30 \times \text{body depth} + 0.25 \times \text{chest depth} + 0.15 \times \text{chest width}$ <u>Type composite:</u> $0.40 \times \text{udder overall score} + 0.30 \times \text{body composite} + 0.15 \times \text{legs overall score} + 0.10 \times \text{rump overall score} + 0.05 \times \text{beef composite}$
	[N]	<u>ISU:</u> $100 + 18.53 \times \{ \text{INEL} / 19.3 + 0.3 \times 0.362 (\text{udder composite} - 50) + 0.25 \times 0.296 (\text{body composite} - 50) + 0.1 \times 0.491 (\text{milking speed} - 50) + 0.05 \times 0.398 (\text{muscularity composite} - 50) \}$ <u>Udder composite:</u> $0.206 \times \text{fore udder attachment} + 0.138 \times \text{rear udder attachment} + 0.412 \times \text{udder balance} + 0.408 \times \text{teat direction rear} + 0.205 \times \text{udder support}$ <u>Muscularity composite:</u> $(\text{muscularity at withers} + \text{on back} + \text{at loin} + \text{at rump} + \text{at thighs}) / 5$ <u>Rump composite:</u> $(\text{width at hips} + \text{width at thurls} + \text{width at pins}) / 3$

**FRANCE****Workability traits****Milking speed***continued***Use in total merit index**

[N]

**Body composite:**  $0.103 \times \text{height at withers} + 0.129 \times \text{diagonal body length} + 0.118 \times \text{chest girth} + 0.102 \times \text{chest depth} + 0.107 \times \text{chest width} + 0.108 \times \text{height at withers} + 0.106 \times \text{width at thurls} + 0.0098 \times \text{width at pins}$

**NB:** INEL = Index Economique Laitier =  
Economic Index for Milk production =  $1.15 \times (\text{protein yield} + 3 \times \text{protein content})$

**Key reference on methodology applied**

[H]

Ducrocq, V., 1993. Genetic parameters for type traits in the French Holstein breed based on a multiple trait animal model. *Livest. Prod. Sc.*, 36: 143-156

[N]

Colleau, J.J., C. Beaumont & D. Regaldo, 1989. REML estimation of genetic parameters for type traits in Normande cattle breed. *Livest. Prod. Sci.* 23: 47-66

<b>Conformation traits</b>	<b>Udder:</b>	[H]	udder cleft, udder-hocks distance, udder balance, teat placement side, teat placement front, teat direction rear, teat length, rear udder height
		[M]	fore udder attachment, rear udder height, rear udder width, udder volume, udder balance, suspensory ligament, teat placement front, teat direction rear, teat length, teat form, udder overall score, teat overall score
		[N]	fore udder attachment, rear udder attachment, udder balance, teat direction rear, udder support
	<b>Locomotion:</b>	[H]	rear legs set, heel depth
		[M]	rear legs set, foot angle, legs overall score
	<b>Other:</b>	[N]	rear legs
		[H]	height at sacrum, chest depth, rump length, width at hips, rump angle
		[M]	muscularity at withers and at thighs, height at sacrum, chest width, chest depth, body depth, rump length, width at hips, width at thurl, rump angle, rump overall score
		[N]	muscularity at withers, on back at loin, at rump and at thighs, diagonal body length, chest girth, chest width, chest depth, rump length, height at withers, width at hips, width at thurl, width at pins, rump angle

<b>Breed(s)</b>	[H]	Holstein
	[M]	Montbeliarde
	[N]	Normande
<b>Trait definition and unit(s) of measuring</b>	[H,M]	Most traits are linear scored on a 1-9 point scale, except for body depth and height, length and width traits, which are measured in cm
	[N]	Most traits are scored in 1-5 point scale from undesirable (1) to desirable (5), except for height, length and width traits, which are measured in cm

## FRANCE

Conformation traits <i>continued</i>	Udder Locomotion Other
<b>Method of measuring and collecting data</b>	[H,M,N] Scored by classifier
<b>Time period for data inclusion</b>	[H] Since 1986 [M] Since 1988 [N] Since 1982
<b>Age groups</b>	[H,M] 1 <sup>st</sup> or 2 <sup>nd</sup> lactation (if there is no record in 1 <sup>st</sup> ) [N] 1 <sup>st</sup> or 2 <sup>nd</sup> lactation, all cows of widely used proven bulls, with milk production index INEL > 25 points
<b>Genetic parameters</b>	[H] The traits are divided in 3 groups. Group 1: height at sacrum, chest depth, rump length, width at hips Group 2: udder cleft, udder hock distance, udder balance, teat placement side, teat placement front, teat direction rear Group 3: rump angle, teat length, rear legs set, heel depth, rear udder height $h^2_{\text{group 1}} = 0.23$ to $0.35$ $r_g(\text{between traits in group 1}) = -0.63$ to $0.55$ $h^2_{\text{group 2}} = 0.29$ to $0.47$ $r_g(\text{between traits in group 2}) = -0.23$ to $0.88$ $h^2_{\text{group 3}} = 0.07$ to $0.20$ [M] $h^2_{\text{udder traits}} = 0.12$ to $0.39$ $r_g(\text{between udder traits}) = -0.92$ to $0.92$ $h^2_{\text{locomotion traits}} = 0.12$ to $0.20$ $r_g(\text{between locomotion traits}) = -0.15$ to $0.52$ $h^2_{\text{other traits}} = 0.28$ to $0.54$ $r_g(\text{between other traits}) = 0.08$ to $0.86$ $h^2_{\text{beef traits}} = 0.28$ to $0.30$ [N] $r_g(\text{between beef traits}) = -0.63$ to $0.55$ $h^2_{\text{udder traits}} = 0.20$ to $0.30$ $h^2_{\text{locomotion traits}} = 0.10$ $h^2_{\text{muscularity traits}} = 0.10$ to $0.20$ $h^2_{\text{other traits}} = 0.20$ to $0.40$
<b>Sire categories</b>	[H,M] All bulls [N] AI-test bulls
<b>Environmental effects pre-adjustment evaluation model</b>	[H,M,N] None [H] Within region x year: age at calving x parity, stage of lactation x parity, visit (day x herd x classifier) [M] Within region x year: age at calving, stage of lactation, visit (day x herd x classifier) [N] Within region: semester x year, body condition at scoring, age at calving x parity, herd milk production level class, stage of lactation, classifier

Conformation traits <i>continued</i>	Udder	
	Locomotion	
	Other	
Base for age adjustment	[H,M,N]	None
Use of genetic groups and/or relationships	[H,M]	According to sex, birth year x country of origin, status (AI, NS) for bulls, region for cows
	[N]	For unknown maternal grand sires, according to birth year
Method (model) of genetic evaluation	[H]	MT BLUP AM, separately for group 1 and 2 ST BLUP AM for group 3 (rump angle, teat length, rear legs set, heel depth, rear udder height) (See also genetic parameters on previous page)
	[M]	MT BLUP AM, for each group of traits (udder, locomotion, beef and other traits)
	[N]	ST BLUP Sire-MGS model
System validation	[H,M,N]	-
Expression of proof	[H]	RBV with M = 0 and SD = 1
	[M]	RBV with standardized M = 100 and SD = 12
	[N]	RBV with M = 50 and phenotypic SD = 10
Genetic (reference) base	[H,M]	Rolling average of sires with REL $\geq$ 0.70, with known pedigree and progeny tested in France, born 7-10 years before actual year
	[N]	Rolling average of sires born 7-10 years before current year, having $\geq$ 20 progeny test daughters
Criteria for official publication of sire proofs	[H,M,N]	REL $\geq$ 0.70
Number of evaluations/ publications per year	[H]	Two; June, December
	[M]	One; July
	[N]	Two; March, June
Use in total merit index	[H,M,N]	Included, see page 53
Key reference on methodology applied	[H]	Ducrocq, V., 1993. Genetic parameters for type traits in the French Holstein breed based on a multiple trait animal model. <i>Livest. Prod. Sci.</i> , 36: 143-156
	[N]	Colleau, J.J., C. Beaumont & D. Regaldo, 1989. REML estimation of genetic parameters for type traits in Normande cattle breed. <i>Livest. Prod. Sci.</i> 23: 47-66