

Holstein Association USA, Inc.

Importance of Genetic
Evaluation for
Structure in the US
Dairy Industry

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U.S. Registered Holsteins
FOR MAXIMUM PROFIT



HOLSTEIN ASSOCIATION USA, INC.



Linear Descriptive Traits

- Stature
- Strength
- Body Depth
- Dairy Form
- Rump Angle
- Thurl Position
- Rump Width



Linear Descriptive Traits

- Fore Udder Attachment
- Rear Udder Height
- Rear Udder Width
- Udder Cleft
- Udder Depth
- Front Teat Placement
- Rear Teat Placement



Linear Descriptive Traits

- Teat Length
- Udder Tilt
- Rear Legs, Side View
- Rear Legs, Rear View
- Foot Angle
- Body Condition



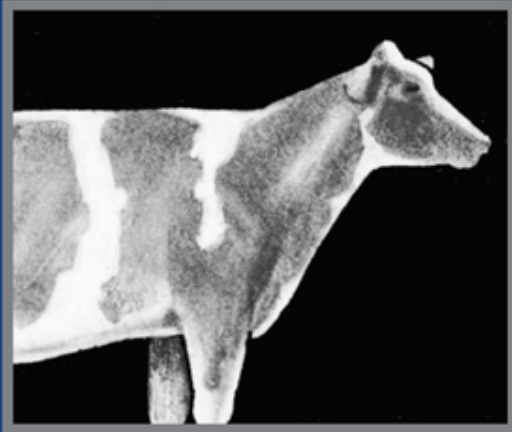
Linear Descriptive Traits

- Traits get recorded and reported individually



BODY DEPTH - BD

Primary Trait



1-5 pts.
Extremely shallow body



25 pts.
Intermediate



45-50 pts.
Extremely deep body

FOOT ANGLE - FA

Primar Trait



1-5 pts.
Extreme low angle



25 pts.
Intermediate angle



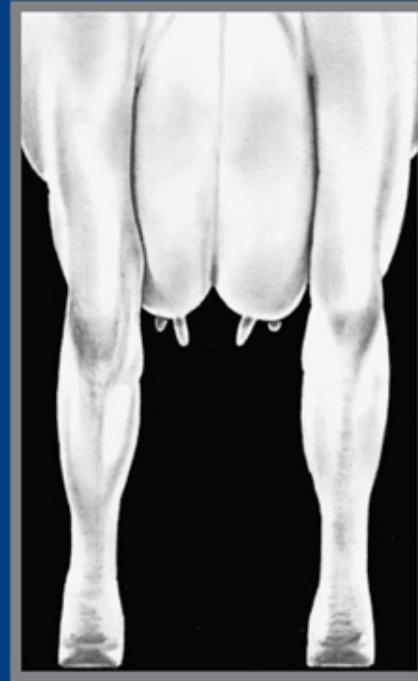
45-50 pts.
Extremely steep angle

REAR LEGS, REAR VIEW - RL

Primary Trait



1-5 pts.
Severe toe-out



45-50 pts.
No toe-out

REAR LEGS, SIDE VIEW - LS

Primary Trait



1-5 pts.
Posty and straight



25 pts.
Intermediate set in hock



45-50 pts.
Extremely sickled

REAR UDDER, WIDTH - UW

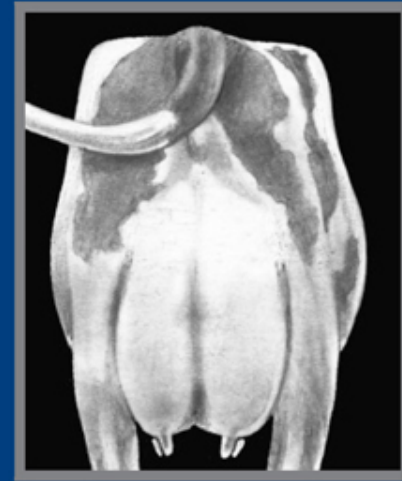
Primary Trait



1-5 pts.
Narrow rear udder



25 pts.
Intermediate width



45-50 pts.
Extremely wide rear udder

Linear Descriptive Traits

- Educational material provided to breeders
- Review regularly
- Research traits added as needed



Final Score

- An overall score
- Based on five major categories (“breakdowns”)
 - Front End and Body Capacity
 - Dairy Strength
 - Rump
 - Feet and Legs
 - Udder



Final Score

- Major Breakdowns
 - 15% Front End and Body Capacity
 - 20% Dairy Strength
 - 5% Rump
 - 20% Feet and Legs
 - 40% Udder



The Classifiers

- Employees of Holstein Association
 - Full time
 - Trained (and refreshers)
 - Continually monitored / evaluated
- Rotated through regions
- No back-to-back on same farm
- Luck of the draw







Types of Classifications

- Sire Evaluation for Type (SET)
 - Young bull daughters compared to herdmates
- Whole herd
 - Or a number of variations for partial herd
 - Options affect which records are used in genetic evaluation







Handheld Computer

- Pre-loaded with
 - Herd Inventory
 - Animal ID
 - “Required” Animals
 - “Optional” Animals
- Record scores for linears and breakdowns
- Print results at farm
- Transmits to laptop to association



Genetic Evaluation

- Phenotypic traits get recorded individually
- Most get a genetic prediction
Beef EPD == Dairy PTA

Linear PTA converted to Standardized Transmitting Abilities (STA)



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Genetic Evaluation

- Multi-trait evaluations
- Repeat measures
- Animal model

- Requires estimation of heritabilities and genetic correlations, and development of appropriate analytical models



Genetic Evaluation

- 13,000,000 Final Scored cows
- 8,000,000 Linear scored cows



Genetic Evaluation

- Using the results
 - 18 conformation predictions per animal
- Linear prediction useful for corrective matings
- Final Score (PTAT) overall prediction



Genetic Evaluation

- Using the results
 - 18 conformation predictions per animal
- Linear prediction useful for corrective matings
- Final Score (PTAT) overall prediction
- No breakdown predictions
- Composites, instead



Composite Predictions

- Feet and Legs
- Udder
- Dairy Capacity
- Body Size



Composite Predictions

- Feet and Legs

$$(FA*.48 + RLRV*.37 - RLSV*.15)*.5 + (\text{Feet \& Legs Score})*.5$$

- Udder

$$UD * .35 + FU*.16 + UH*.16 + UW*.12 + UC*.09 + TP*.05 - RP*.07$$

- Body Size

$$ST*.5 + SR*.25 + BD*.15 + TW*.1$$

- Dairy Capacity



Composite Predictions

- Allow weighted selection on functional traits without becoming overwhelmed in data



Total Performance Index

- Combines
 - Conformation (28%)
 - Production (43%)
 - Health & Fertility (29%)



TPI – Total Performance Index

45% emphasis on Production	Fat and Protein & part of PTAT
21% emphasis on Udder Health	SCS, UDC & part of PTAT
21% emphasis on Early Breeding	DPR, PL & DF
8% emphasis on Mobility	FLC & part of PTAT
3% emphasis on Calving Ability	Daughter Calving Ease & Stillbirth
2% emphasis on Body Size	Part of PTAT

Net Merit \$ Index

- Classical production function
- Uses Composite Conformation Traits
 - Udder
 - Feet and Legs
 - Body Size
- Detailed derivation online



Browser tabs: http://www.holst... Gene... h... icar ...

Find

In Sire Information

7 8 9 10

708G	TRAIT	STA		2	1	0	1	2
1709M	Protein	2.58	High					
	Fat	2.70	High					
	Final Score	2.07	High					
+1664	Productive Life	0.00						
	Somatic Cell Score	0.38	Low					
	Stature	2.02	Tall					
GRP	Strength	0.38	Strong					
25231	Body Depth	0.77	Deep					
936	Dairy Form	1.50	Open Rib					
772	Rump Angle	1.05	High Pins					
0 %US	Thurl Width	0.74	Wide					
69 %R	R Legs-Side View	0.85	Straight					
55 %R	R Legs-Rear View	2.67	Straight					
50 %R	Foot Angle	2.09	Steep					
AASC	Feet & Legs Score	0.82	High					
79.8	Fore Attachment	1.26	Strong					
	Rear Udder Height	1.62	High					
+1.37	Rear Udder Width	2.00	Wide					
	Udder Cleft	1.23	Strong					
ACTIVE	Udder Depth	1.68	Shal low					
72/S: 1	F Teat Placement	1.28	Close					
JOHN	R Teat Placement	0.78	Close					
	Teat Length	1.52	Short					

8.50 x 11.00 in



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Trait Selection

- Information overload



Trait Selection

- Information overload
- Economically relevant
- Use to form composite predictions
- Incorporate in selection indexes
- Use within mating programs







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