

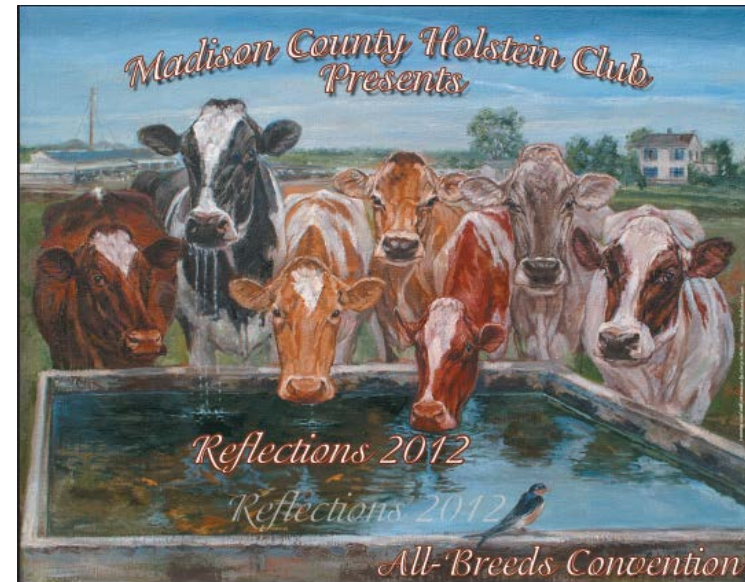
# Haplotypes impacting Fertility

Dr. Tom Lawlor, Holstein USA

2012 All Breeds Convention

January 21, 2012

Syracuse, NY



In 2008, DNA sequence of the cow was first published.



And we keep learning more and more

# USDA research

Breed	Label	Frequency	Earliest Known Ancestors
Holstein	HH1	4.5%	Pawnee Farm Arlinda Chief
	HH2	4.6%	Willowholme Mark Anthony
	HH3	4.7%	Gray View Skyliner Glendell Arlinda Chief
Jersey	JH1	23.4%	Observer Chocolate Soldier
Brown Swiss	BH1	14.0%	West Lawn Stretch Improver

# Evidence

- These haplotypes are **never observed** in a homozygous state in any live animals.
- **Decreased conception rate** was observed when a *carrier* sire was mated to a daughter of a *carrier* maternal grandsire



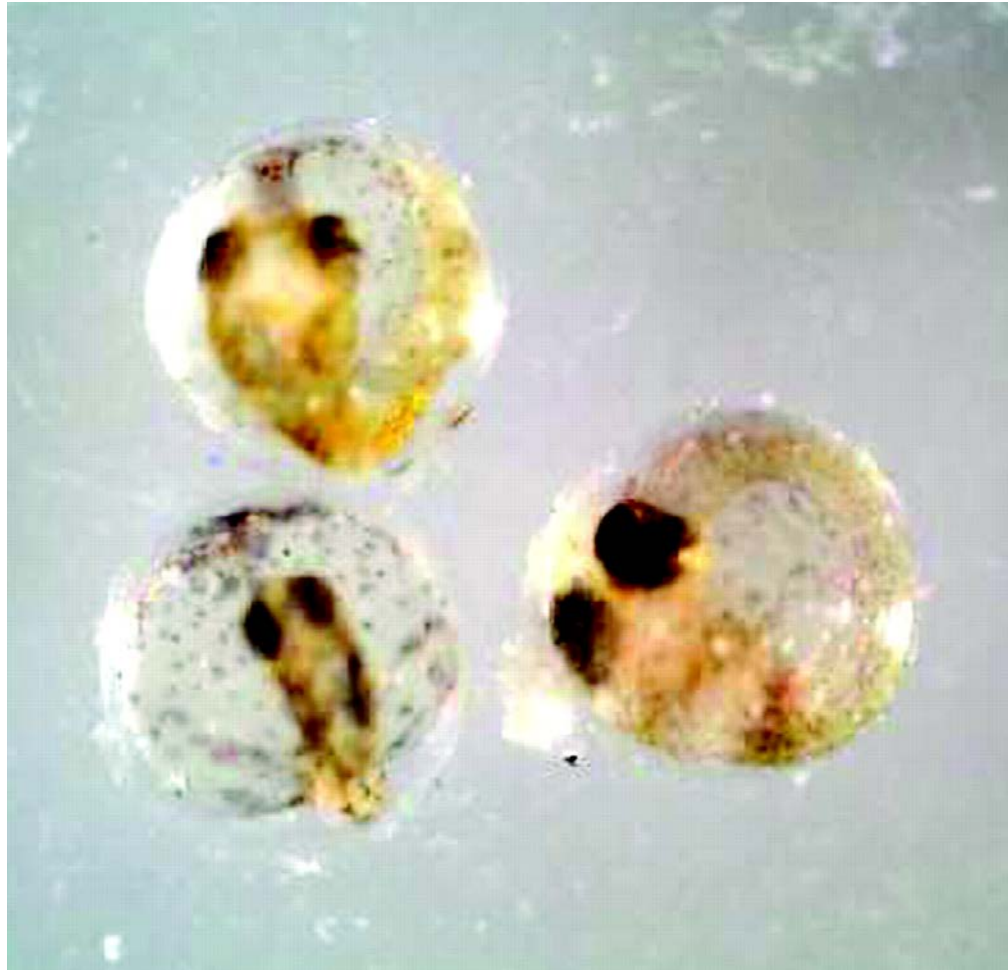
# Every animal carries some undesirable genetic condition

- It usually only comes to light if an animal is popular.
- We don't want to punish only those animals from popular bloodlines.
- So ..... Don't over-react.

# It's not surprising

- Birds do it...
  - Bees do it...
  - Fish do it...
- Produce unviable offspring

# Basic biology tells us that **ALL** animals carry some lethal genes



Normal and mutant phenotypes for Zebra fish.

# Zebra fish



Young fish are transparent, and their organs are fully formed after three days.

So it's easy to follow their embryonic development.





# Example: Oxygen carrying defect

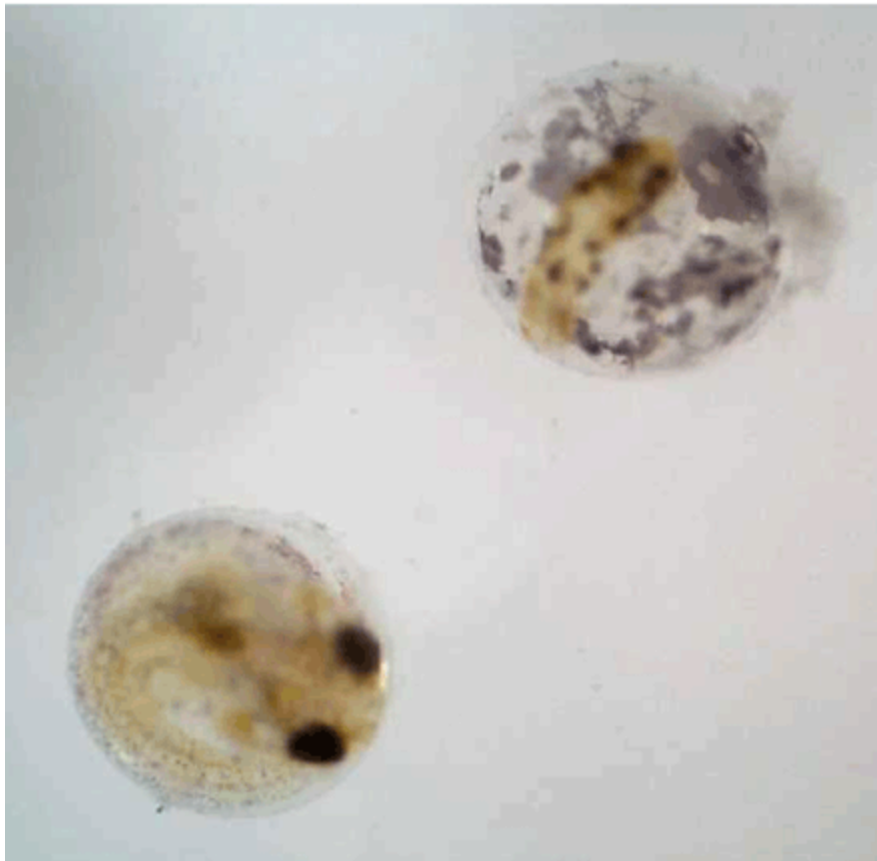
*weissherbst (weh) mutation*



***Normal***



***Reduced hemoglobin***



**Twelve days post-fertilization.**

**Normal embryo**

**Defective embryo (small head)**



**The defective fry cannot eat.**

**The normal fry has a bolus of food  
in its gut.**

# Genetic Load

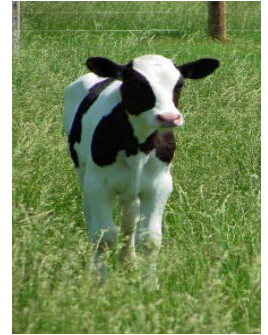
- The average number of unfavorable recessive gene mutations per individual in a population
- Geneticists believe that most species carry a "**genetic load**" of 3-5 recessive lethal genes.
- It's not a problem UNLESS your mate carries one of the same conditions.

# What's a haplotype?

- A **haplotype** is a stretch of chromosome or DNA that is transmitted as a unit from one generation to the next.

..AGCTTTAAGCCATACCTTAGGACATTACCTAGGAGCCATAC...

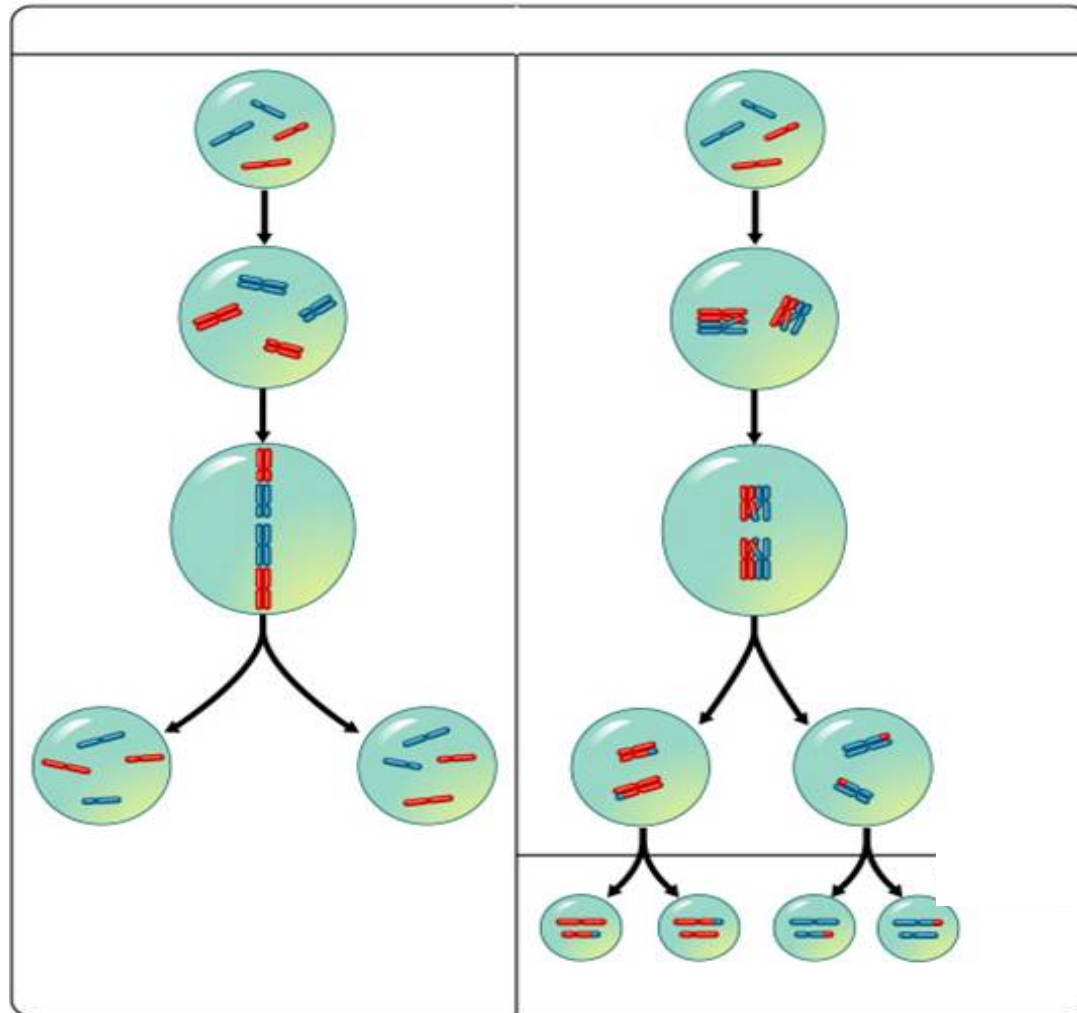
# Haplotypes



- Where do they come from?
- How are haplotypes created?

# Mitosis

# Meiosis



Normal cell replication

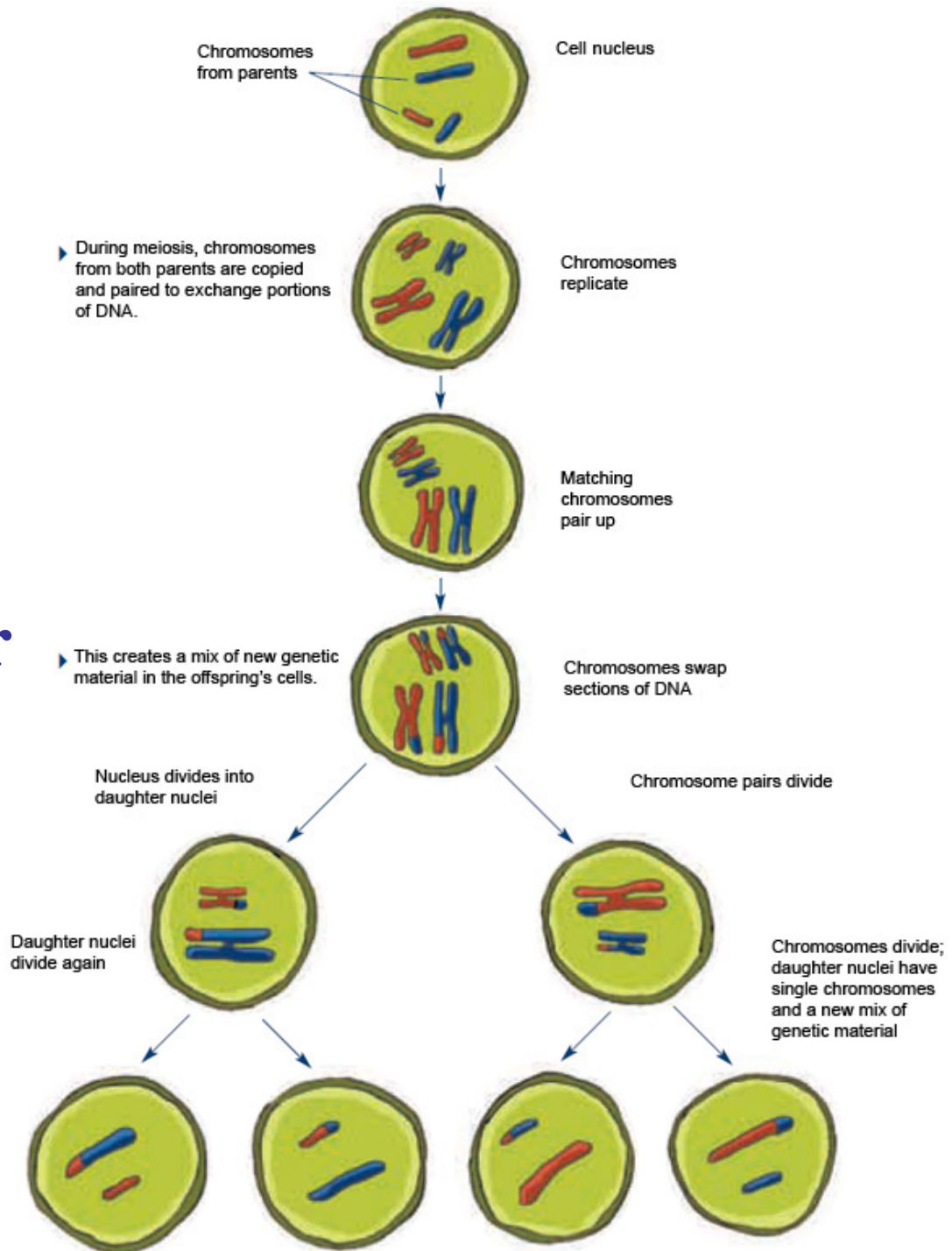
Sex cell replication

# Meiosis

Duplicate

Crossing over occurs

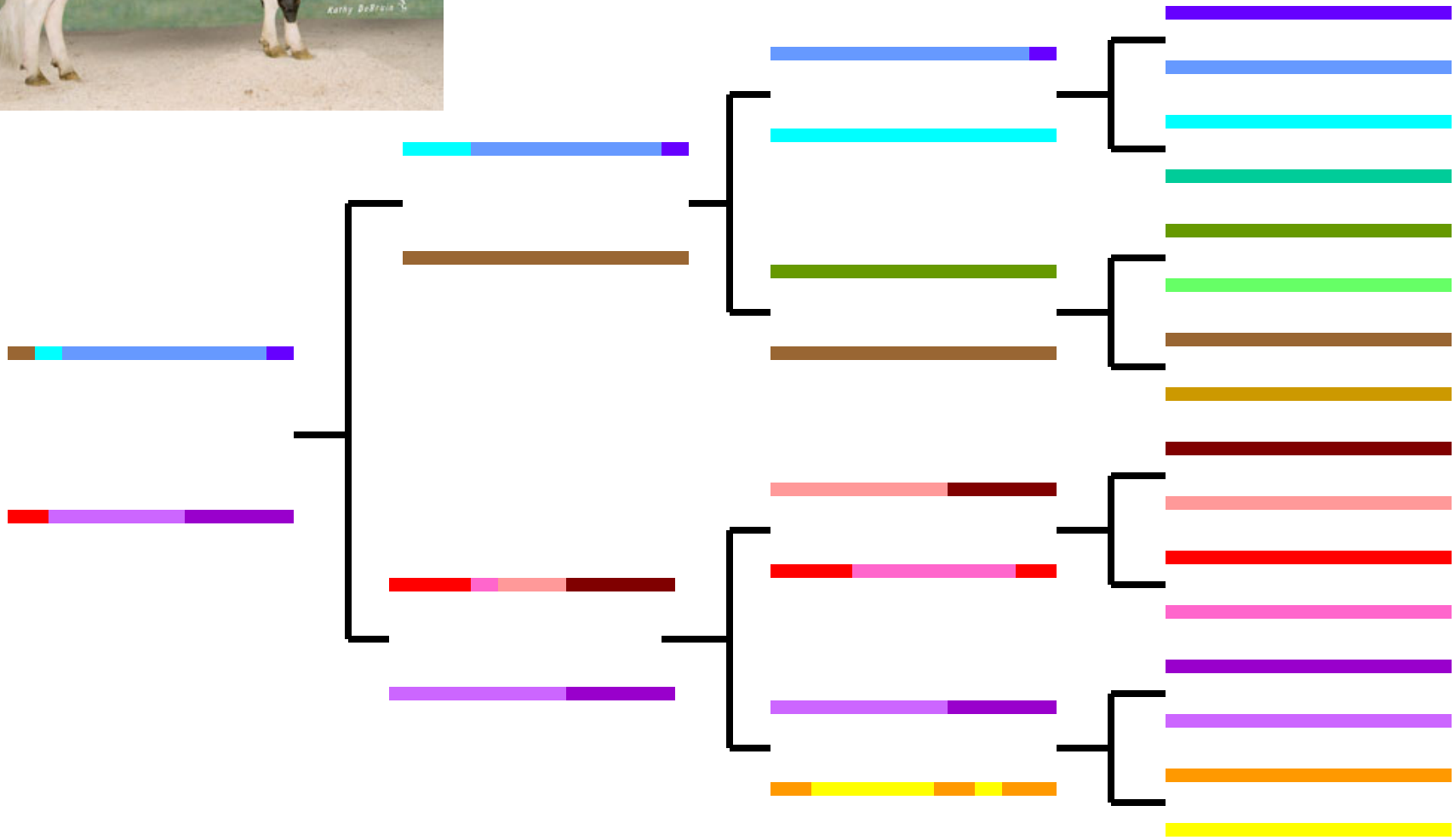
Divide





# O-Style

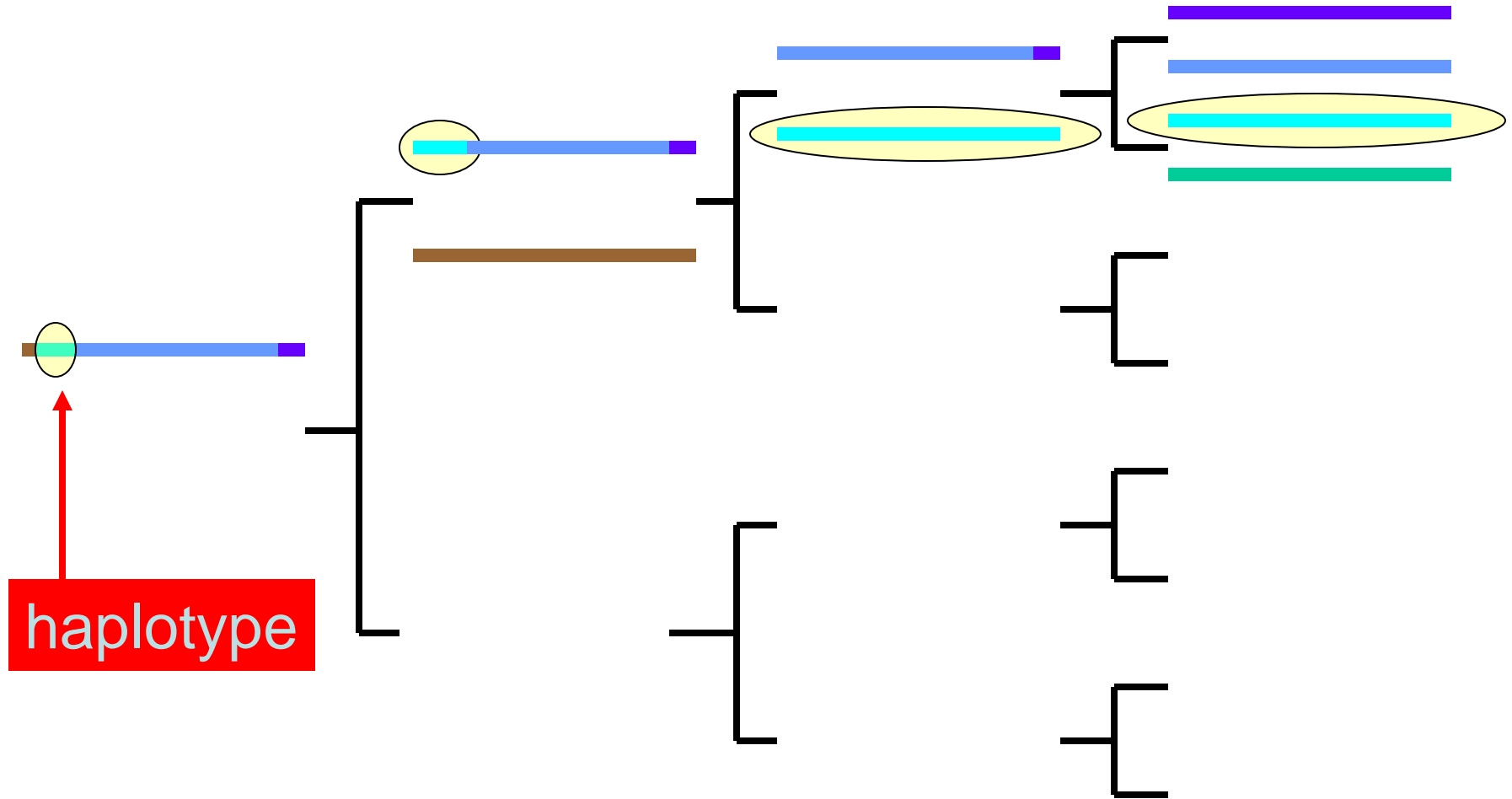
*know exactly where his DNA came from*



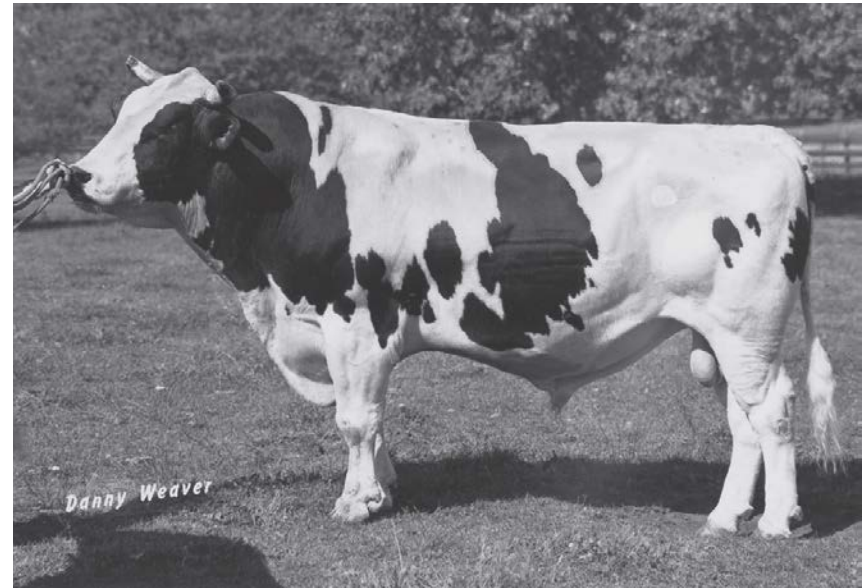
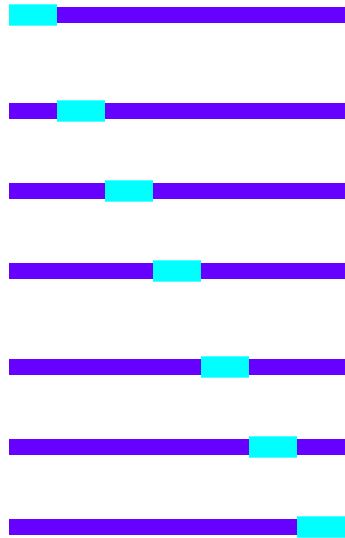
Chromosome 15




Haplotypes are created as the  
*original DNA sequence gets broken into smaller pieces*

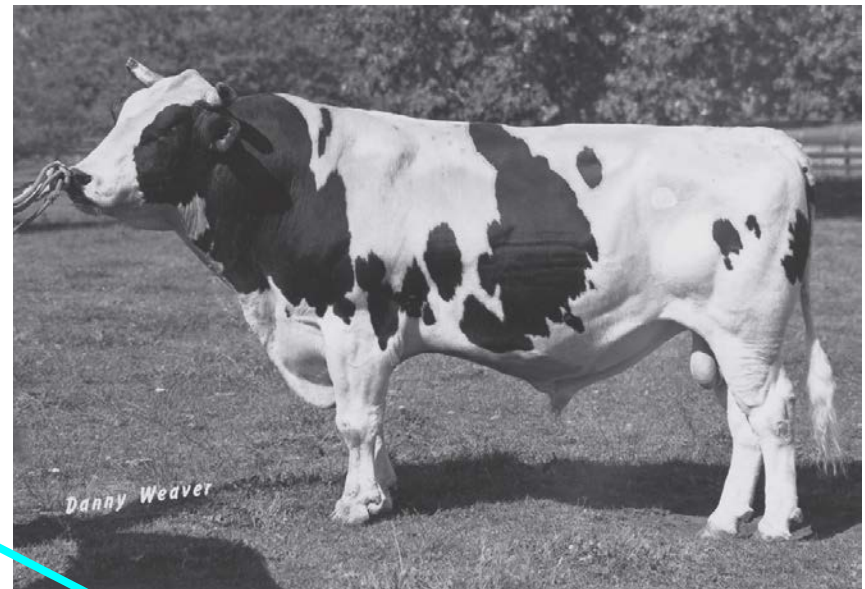
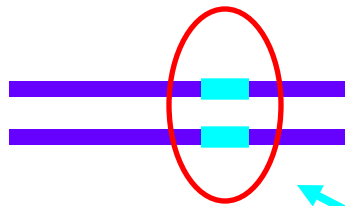


For a popular bull, we're able to find many small DNA segments (**haplotypes**) of his original chromosome amongst the current genotyped descendants



  
original chromosome

And we're usually able to find two identical (homozygous) copies of a haplotype.



original chromosome

# Haplotypes impacting fertility

- Certain haplotypes never appear in a homozygous condition.
- For example, we never find an animal with the genotype

**ATACTTAGGGCTTATACCTAGGGAGCTGACCTGAC**  
**ATACTTAGGGCTTATACCTAGGGAGCTGACCTGAC**

***This stretch of DNA must contain a lethal condition***

**Bulls' status for haplotypes impacting fertility on the records of  
Holstein Association USA, Inc. as of 12/09/2011  
(Blank=Tested-Free, C=Carrier)**

Stud Code	Name	Registration	HH1	HH2	HH3
1HO09054	SCHULTZ FARM DC RAPE CRI-ET	USA 62398834	C		
	SCHULTZ-FARM-JE R B10211-ET	USA 66631680	C		
	SCHULTZ-FARM-JE R B10218-ET	USA 66631687	C		
	SCHULTZ-FARM-SHF ALTABAM-ET	USA 66631635	C		
	SCHUTTECREST AIR DENO-ET	USA 66076004	C		
	SCIOSPRING REESES	USA 66741932		C	
8HO02580	SCRUTON VINSON	USA 2100763	C		
7HO06166	SDA EMORY NICK PAT-ET	USA 17314808			C
	SEAGULL-BAY MADMAN-ET	USA 65751903			C
	SEAGULL-BAY MALVOY-ET	USA 65751907		C	C
	SEAGULL-BAY PLAYBOOK-ET	USA 66372145			C
11HO01855	SECOND-LOOK SEDUCER	USA 2004710			C
73HO02619	SEELBY CARNIVORE-ET	CAN 6167983	C		
14HO05664	SEITVIEW MARION MAXX-TW	USA 63443541	C		
1HO06402	SENECA-VALLEY SNAPPER	USA 121628772	C		

**December 2011, Active AI 70% REL Bulls by JPI**

REGISTRY STATUS CODES IN ANIMAL NAMES. Registry status codes PR and GR are an for those animals recorded at the Provisional Register and Genetic Recovery levels, respec status code of HR is not included in the registration name. Refer to the inside back cover.

Name of Bull	Registration Number	GT	JH1	NAAB Code
SUN VALLEY IMPULS JUPITER	USA 115870022	50K	F	29JE3615
TOLLENAARS IMPULS LOUIE 260-ET	USA 061929276	50K	C	14JE473
CAL-MART JACE STRUNK	USA 115685866	50K	F	29JE3616
PR OOMSDALE ROCKET GOOSE-ET	USA 067027311	50K	F	1JE672
D&E PAUL-ET	USA 115181456	50K	F	11JE944
TOLLENAARS IMPULS LEGAL 233-ET	USA 061929249	50K	C	29JE3506
ISDK Q IMPULS	DNK 000301592	50K	F	236JE3
ABBOTT OF D&E	USA 114756406	50K	F	11JE928
SF IMPULS 8916	USA 114635185	50K	C	1JE648
CAVE CREEK KANOO-ET	USA 114118219	50K	F	7JE1100
BW VENERABLE-ET	USA 114901730	50K	F	200JE986
CAVE CREEK VERMEER-ET	USA 114849531	50K	F	1JE666
TOLLENAARS ARTIST LYNDON-ET	USA 061929278	50K	F	29JE3508
PR OOMSDALE GRATITUDE LEXING LIAM	USA 067027366	50K	C	14JE509
VICTOR KIRK OF ALL LYNNS	USA 115255083	50K	C	11JE943
SR IMPULS STONE-ET	USA 114332783	50K	F	1JE634
FAIRWAY KLASSIC KILOWATT-ET	USA 114656667	50K	F	11JE921
DUTCH HOLLOW LEXICON	USA 115479865	50K	F	1JE700
RICHIES JACE TBONE A364	USA 113672851	50K	F	7JE1000
GABYS NATHAN PROTECTOR-ET	USA 115107063	50K	F	200JE343

Brown Swiss A.I. Sires Identified as BH1 Haplotype Carriers  
(\*Tested using 50K chip)

BSUSA000000163153	1972	I	021BS00415	WEST LAWN STRETCH IMPROVER (M)
BSUSA000000176943	1980	I	029BS03687	JOHANN MR MAGIC ET
BSUSA000000179888	1982	I	029BS03700	JUST SO LUCRATIVE ET
BSUSA000000181329	1984	A	076BS09016	VICTORY ACRES JUBILAT EMORY*TM
BSUSA000000183095	1986	I	021BS00449	LONE OAK IMA DAZZLER ET
BSUSA000000183189	1986	I	029BS03712	JOHANN LUCIFER ET (M)
BSUSA000000184298	1987	I	014BS00215	SNOWBIRDS COMBUSTION ET
BSUSA000000184560	1988	I	151BS00015	SNOWBIRDS SIMONIZE
BSUSA000000186040	1989	A	076BS00900	VICTORY ACRES SIMON EVEN ET*TM
BSUSA000000186951	1990	I	029BS03721	ROUND HILL CONDUCTOR EXIDE ET
BSUSA000000187103	1990	I	001BS00480	LONE OAK IMA DOLLSON ET
BSUSA000000187361	1990	I	054BS00256	LYNDALE EMORY EMERALD ET
BSUSA000000187451	1990	I	009BS00071	R BAY EMORYS EARNEST T
BSUSA000000187362	1991	I	029BS03724	LYNDALE EMORY LEGACY ET
BSUSA000000187668	1991	I	001BS00493	BETTA VUE EMORY PRELUDE ET
BSUSA000000188212	1991	I	151BS00073	AMBER RAE EMORYS DUKE

# Economic importance

- Economic loss is less when the loss is early.
- Economic loss is less when frequency is low.

Name	Haplotype frequency	Impact on Conception rate	Timing of Pregnancy Loss
HH1	4.5%	-0.35%	Throughout gestation
HH2	4.6%	-0.36%	Before day 100
HH3	4.7%	-0.36%	Before day 60
JH1	23.4%	-2.22%	Before day 60
BH1	14.0%	-0.98%	Before day 100

# What should I do?



- **Continue to use animals of superior genetic merit.**  
*Impact of reduced fertility is already partially taken into account in:  
Sire Conception Rate, Daughter Pregnancy Rate, NM\$, TPI, JPI, and PPR.*
- **Lower the risk of carrier-to-carrier matings.**  
*Genotype your animals.  
Avoid certain sire-by-maternal grandsire matings.*

# Which families have which haplotypes?

Name	Key Sire Fathers
HH1	Chief, Mark, Lindy, Formation, Throne, Jordan-Red, Palermo
HH2	Outside, Boulet Charles, Colby, Million, Mr. Burns
HH3	Glendell, Rotate, Emory, O Man, Boss Iron, Snowman
JH1	Top Brass, Sooner, Berretta, Hallmark, Paramount, Jace, Louie
BH1	Stretch Improver, Emory, Prelude, Even, Earnest T Peerless, Vigor



# Which families have which haplotypes?



1,017  
Available Bulls

**HH2**  
18 **C** bulls

Red Book Plus

File Options Bulls Database Help

Print Print Preview Font Export Params Export Import Herd Info Exit

Show Sires Sire Selection

Reports Criteria Fields Mating Index Multi Trait Index

Manual Save Bulls Load Bulls Highlight

HH2	Short name	Code#	TPI	S. Short name	MGS Short
C	GENEVA	29HO11943	1667	TITANIC	OUTSIDE
C	PERFORM	7HO08914	1798	TITANIC	OUTSIDE
C	MR BURNS	200HO05024	1789	THUNDER	STORM
C	STRUIK	206HO00153	1665	SHOTTLE	
C	DURABLE	7HO09107	1997	SEPTEMBER STORM	OUTSIDE
C	POWERHOUSE	76HO00437	1392	OUTSIDE	STARDUST
C	POPULAR	76HO00442	1456	OUTSIDE	JUROR
C	ESCALATE	76HO00466	1572	OUTSIDE	RUDOLPH
C	BRICK	200HO01818	1513	OUTSIDE	PATRON
C	JANCE	536HO00322	1953	OUTSIDE	DUSTER
C	SHOWMAN	14HO04661	1627	OUTSIDE	MANDEL
C	COLBY	7HO07615	1967	OUTSIDE	RUDOLPH
C	MILLION	7HO08165	1794	OUTSIDE	BW MARSHALL
C	GOLDEN *RC	1HO08890	1828	MARMAX	OUTSIDE
C	DEPUTY	200HO02087	1986	LAUDAN	OUTSIDE
C	REVAMP	29HO13712	1843	ELEGANT	OUTSIDE
C	DIE-CAST	14HO05880	1814	DIE-HARD	OUTSIDE
C	PLATNUM *RC	76HO00577	1667	ADVENT-RED	OUTSIDE
No. Bulls			18		
Average			1740.44		
Minimum			1392.00		
Maximum			1997.00		

Evaluate Selection

Input Bull Data

Mating Advisor

Multi-Mate



**HH2C**

**Pedigrees**

HH2	Short name	Code#	TPI	S. Short name	MGS Short
C	GENEVA	29HO11943	1667	TITANIC	OUTSIDE
C	PERFORM	7HO08914	1798	TITANIC	OUTSIDE
C	MR BURNS	200HO05024	1789	THUNDER	STORM
C	STRUIK	206HO00153	1665	SHOTTLE	
C	DURABLE	7HO09107	1997	SEPTEMBER STORM	OUTSIDE
C	POWERHOUSE	76HO00437	1392	OUTSIDE	STARDUST
C	POPULAR	76HO00442	1456	OUTSIDE	JUROR
C	ESCALATE	76HO00466	1572	OUTSIDE	RUDOLPH
C	BRICK	200HO01818	1513	OUTSIDE	PATRON
C	JANCE	536HO00322	1953	OUTSIDE	DUSTER
C	SHOWMAN	14HO04661	1627	OUTSIDE	MANDEL
C	COLBY	7HO07615	1967	OUTSIDE	RUDOLPH
C	MILLION	7HO08165	1794	OUTSIDE	BW MARSHALL
C	GOLDEN *RC	1HO08890	1828	MARMAX	OUTSIDE
C	DEPUTY	200HO02087	1986	LAUDAN	OUTSIDE
C	REVAMP	29HO13712	1843	ELEGANT	OUTSIDE
C	DIE-CAST	14HO05880	1814	DIE-HARD	OUTSIDE
C	PLATNUM *RC	76HO00577	1667	ADVENT-RED	OUTSIDE

# Confirm Carrier status of ancestor

Bulls' status for haplotypes impacting fertility on the records of  
Holstein Association USA, Inc. as of 12/09/2011  
(Blank=Tested-Free, C=Carrier)

OUTSIDE

Stud Code	Name	Registration	HH1	HH2	HH3
73HO01842	COMESTAR LOYDS-ET	CAN 5183344		C	
200HO05350	COMESTAR LS LOGICAL-ET	CAN 102482565		C	
39HO00767	COMESTAR MALIBU-ET	CAN 6581697	C		
200HO05312	COMESTAR MODEL FRANK-ET	CAN 101760604		C	
200HO05982	COMESTAR MOUNTAIN-ET	CAN 105331864		C	
200HO04618	COMESTAR NATIONAL-ET	CAN 9194914		C	
73HO02479	COMESTAR <b>OUTSIDE-ET</b>	CAN 6026421		<b>C</b>	
	COMESTAR PRIDE-ET	CAN 6571872	C		
	COMESTAR TEMPLAR	CAN 102482559		C	
	COMESTAR TRAVIS-ET	CAN 6334342	C		
11HO11126	COMYN-PBCD ALTASTAVELY-ET	USA 69932056			C
11HO09712	CON-RIVER ALTAKO-ET	USA 136868680	C		
7HO09532	CON-RIVER FBI AGENT-ET	USA 137915200	C		
9HO02253	CONANT-ACRES STAFFORD-ET	USA 2269283	C		
21HO01927	CONANT-ACRES-JY SAMUEL	USA 2080975			C



**HH3**

**41 C bulls**

**Male Carriers for Haplotypes Impacting Fertility on the Records of  
Holstein Association USA, Inc. as of 12/09/2011  
(Blank=Tested-Free, C=Carrier, N=Not Tested)**

Stud Code	Name	Registration	HH1	HH2	HH3
7H006417	O-BEE MANFRED JUSTICE-ET	USA 122358313			C



**HH1**

**52 C bulls**

**Male Carriers for Haplotypes Impacting Fertility on the Records of  
Holstein Association USA, Inc. as of 12/09/2011  
(Blank=Tested-Free, C=Carrier, N=Not Tested)**

Stud Code	Name	Registration	HH1	HH2	HH3
14HO03831	VEAZLAND MARION-ET	USA 130153294	C		
11HO05570	OPSAL FINLEY-ET	USA 120780521	C		
11HO04400	DIXIE-LEE AARON-ET	USA 2265005	C		

14HO05411

GLENN-ANN PALERMO-ET

USA 137332056

C

CAN 393207 100%-NA  
MARK CJ GILBROOK GRAND-ET  
28HO00202 04/06/1986  
TM TL  
BT GT

**Ped**

CAN 5902195 100%-NA  
SHOREMAR JAMES  
73HO02400 05/30/1993  
TV TL  
BT GT

**Ped**

CAN 5337384 100%-NA  
STELBRO JENINE AEROSTAR  
02/23/1991

**Ped**

CAN 10705608 100%-NA  
BRAEDALE GOLDWYN  
200HO03205 01/03/2000  
TV TL  
BT GT

**Ped**

CAN 5457798 100%-NA  
MAUGHLIN STORM-ET  
73HO02012 08/26/1991  
B/R TV TL  
BT GT

**Ped**

CAN 6860888 100%-NA  
BRAEDALE BALER TWINE-ETS  
11/08/1997  
TL  
GT

**Ped**

CAN 5912235 100%-NA  
BRAEDALE GYPSY GRAND  
09/20/1993

**Ped**

USA 137332056 100%-NA  
GLENN-ANN PALERMO-ET  
14HO05411 01/02/2006  
TV TL TY  
GT

**Ped**

CAN 383622 100%-NA  
MADAWASKA AEROSTAR  
39HO00246 03/25/1985  
TV TL  
BT GT

**Ped**

CAN 5470579 100%-NA  
STARTMORE RUDOLPH-ET  
73HO01965 07/17/1991  
TV TL  
BT GT

**Ped**

CAN 4324253 100%-NA  
STARTMORE RACHELLE-ET  
12/30/1985  
TL

**Ped**

USA 129570185 100%-NA  
GLENN-ANN MISS PEPPERDINE  
03/19/2000  
GT

**Ped**

USA 120226502 100%-NA  
WILCOXVIEW PERFEC FORMATION  
12/07/1997  
BT GT

**Ped**

USA 2163822 100%-NA  
SHEN-VAL NV LM FORMATION-ET  
11HO03562 01/16/1991  
TV TL TY  
BT GT

**Ped**

USA 14710851 100%-NA  
WILCOXVIEW BLACKSTAR PEPPER  
03/06/1992

**Ped**

Goldwyn is NOT a carrier

Rudolph is NOT a carrier

**Where is HH1 coming from ?**

**Pedigree Tree**

**HOUSAM137332056**   **GLENN-ANN PALERMO-ET** <sup>G</sup>   **PALERMO**  
 0014HO05411   ET BW BYF CVF BLF   Born 02-JAN-06   9.50%INB   17%R  
 HH1-2-3: 99%, 1%, 1%

**BRAEDALE GOLDWYN** <sup>G</sup>  
[HOCANM10705608](#)  
 Born: 03-JAN-00  
 BW BLF CVF  
 HH1-2-3: 1%, 1%, 1%

**SHOREMAR JAMES** <sup>G</sup>  
[HOCANM5902195](#)  
 Born: 30-MAY-93  
 BW BLF CVF  
 HH1-2-3: 1%, 1%, 1%

**BRAEDALE BALER TWINE** <sup>G</sup>  
[HOCANF6860888](#)  
 Born: 08-NOV-97  
 ETM BW BLF  
 HH1-2-3: 1%, 1%, 1%

**A MARK CJ GILBROOK GRAND ET** <sup>G</sup>  
[HOCANM393207](#)  
 Born: 06-APR-86  
 ET BW BLF MFF

**STELBRO JENINE AEROSTAR**  
[HOCANF5337384](#)  
 Born: 23-FEB-91  
 BW BLF

**MAUGHLIN STORM** <sup>G</sup>  
[HOCANM5457798](#)  
 Born: 26-AUG-91  
 ET BW BLF CVF BRC

**BRAEDALE GYPSY GRAND**  
[HOCANF5912235](#)  
 Born: 20-SEP-93  
 BW

**GLENN-ANN MISS PEPPERDINE**  
[HOUSAF129570185](#)  
 Born: 19-MAR-00  
 BW  
 HH1-2-3: 99%, 1%, 1%

**STARTMORE RUDOLPH** <sup>G</sup>  
[HOCANM5470579](#)  
 Born: 17-JUL-91  
 ET BW CVF BLF  
 HH1-2-3: 1%, 1%, 1%

**MADAWASKA AEROSTAR** <sup>G</sup>  
[HOCANM383622](#)  
 Born: 25-MAR-85  
 BW CVF BLF

**STARTMORE RACHELLE ET**  
[HOCANF4324253](#)  
 Born: 30-DEC-85  
 ET BW BLF

**SHEN-VAL NV LM FORMATION-ET** <sup>G</sup>  
[HOUSAM2163822](#)  
 Born: 16-JAN-91  
 ET BW BYF CVF BLF

**WILCOXVIEW PERFEC FORMATION**  
[HOUSAF120226502](#)  
 Born: 07-DEC-97  
 BW  
 HH1-2-3: 99%, 1%, 1%

**WILCOXVIEW BLACKSTAR PEPPER**  
[HOUSAF14710851](#)  
 Born: 06-MAR-92  
 BW

Probability  
of having  
a certain  
haplotype



# SF IMPULS 8916

[GE Summary](#)[Genomics](#)[Progeny](#)[Pedigree](#)[Inbreeding](#)


## Pedigree Tree

**JEUSAM114635185**    **SF IMPULS 8916** 

0001JE00648

JH1: 99%

Born 19-MAY-05

**JAS ARTIST**   
[JEDNKM301607](#)  
Born: 11-OCT-98

JH1: 1%

**SKAE IDE**  
[JEDNKM49522](#)  
Born: 20-APR-92

JH1: 1%

**DANISHCOW00636**  
[JEDNKF4004800636](#)  
Born: 21-OCT-95

JH1: 1%

**MEADOW LAWN J IMPERIAL 50R ET**   
[JECANM137656](#)  
Born: 04-JUL-83  
ET


**DANISH COW00394**  
[JEDNKF4620600394](#)  
Born: 28-AUG-87

**FYN TANIC**  
[JEDNKM47843](#)  
Born: 20-OCT-87

**DANISHCOW00580**  
[JEDNKF4004800580](#)  
Born: 15-DEC-93

**SF LEMVIG 6900**  
[JEUSAF111959583](#)  
Born: 30-NOV-00


JH1: 99%

**ISDK FYN LEMVIG**   
[JEDNKM300003](#)


JH1: 1%

**SF BERRETTA C3412**  
[JEUSAF4015906](#)  
Born: 09-APR-96

JH1: 99%

**HIGHLAND DUNCAN LESTER**   
[JEUSAM645454](#)  
Born: 11-OCT-85

**DNK NO. 400650432**  
[JEDNKF6500432](#)  
Born: 08-OCT-88

**MASON BOOMER SOONER BERRETTA**   
[JEUSAM651835](#)  
Born: 18-MAR-89

**SF SKY LINE B2861**  
[JEUSAF379064943](#)  
Born: 23-JUL-93



# Matings of HH1, HH2, and HH3 carrier females with carrier bulls can be excluded.

The screenshot shows the Red Book Plus software interface, specifically the Mating Setup window. The window title is "Red Book Plus" and it has a menu bar with "File", "Options", "Bulls", "Database", and "Help". Below the menu bar is a toolbar with icons for "Print", "Print Preview", "Font", "Export Params", "Export", "Import", "Herd Info", and "Exit".

The main window is divided into several sections:

- Show Sires:** A search icon and the text "Show Sires".
- Sire Selection:** A multi-colored icon and the text "Sire Selection".
- Evaluate Selection:** A checkmark icon and the text "Evaluate Selection".
- Input Bull Data:** A calculator icon and the text "Input Bull Data".
- Mating Advisor:** The text "Mating Advisor".
- Multi-Mate:** A multi-colored icon and the text "Multi-Mate".

The Mating Setup window has a tabbed interface with the following tabs: "Mating Results", "Cow Data", "Mating Goals", "Mating Setup" (selected), "Semen Restriction", "Mating Summary", and "Best Matings".

The Mating Setup window contains the following options:

- Mating:** A dropdown menu set to "LINEAR".
- Assume Cows with no data are breed average
- Include aAa
- Include DMS
- Inbreeding Limitation:** A dropdown menu set to "OPTIMIZE GENETICS".
- Max Inbreeding %:** A text box containing "6.25".
- Recessives To Exclude:** A list of checkboxes: BL - BLAD, BY - Brachyspina, CV - CVM, MF - Mule-Foot.
- Haplotypes To Exclude:** A list of checkboxes: HH1, HH2, HH3. The "Exclude" checkbox is checked.
- Use Calving Ease Bulls
- Bull Maximum Calving Ease %:** A text box containing "9".
- Use Calving Ease Bulls on Cows:** A text box containing "9".
- Calving Ease value greater than:** A text box containing "9".

The "Fields to List on Mating Report:" section has two columns: "Available:" and "Selected:".

Available:	Selected:
CowID	<input checked="" type="checkbox"/> CowID
Barn Name	<input type="checkbox"/> Barn Name
Lactation	<input type="checkbox"/> Traits to Improve
Traits to Improve	<input type="checkbox"/> 1st NAAB
1st Registration #	<input type="checkbox"/> 1st Mating Index
1st NAAB	<input type="checkbox"/> 1st Inbreeding %
1st Short Name	<input type="checkbox"/> 2nd NAAB
1st Mating Index	<input type="checkbox"/> 2nd Mating Index
1st Inbreeding %	<input type="checkbox"/> 2nd Inbreeding %
2nd Registration #	<input type="checkbox"/> 3rd NAAB
2nd NAAB	<input type="checkbox"/> 3rd Mating Index
2nd Short Name	<input type="checkbox"/> 3rd Inbreeding %
2nd Mating Index	
2nd Inbreeding %	
3rd Registration #	
3rd NAAB	
3rd Short Name	
3rd Mating Index	
3rd Inbreeding %	

Buttons "UP" and "DN" are located to the right of the "Selected:" list. An "Update Default list" button is at the bottom right of the "Fields to List on Mating Report:" section.

# Exclude **carrier** to **carrier** matings

## Recessives To Exclude:

- BL - BLAD
- BY - Brachyspina
- CV - CVM
- MF - Mule-Foot

## Haplotypes To Exclude:

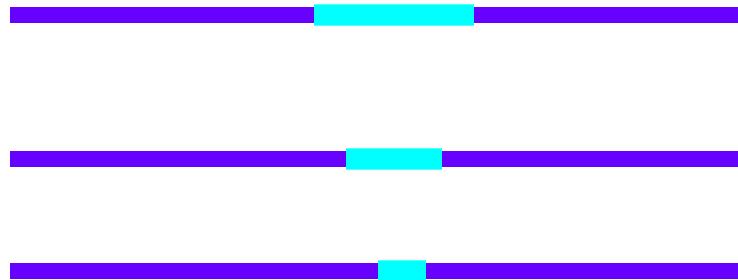
Exclude

- HH1
- HH2
- HH3



# Will we ever find the cause of the genetic condition?

- Yes, as more animals are genotyped, new crossovers occur, which allows us to narrow down the affected DNA area segment.



- Example, we now have an exact gene test for Brachyspina.

# Barachyspina is a deletion in a gene responsible for DNA repair.

NCBI  
Cow genome overview page (5.2)  
Cow genome overview page (Btau\_4.0)  
Map Viewer Home  
Map Viewer Help  
Cow Maps Help  
FTP  
Data As Table View  
Maps & Options  
Region Shown:  
20,150K  
20,840K  
Go  
out  
200x  
in  
You are here:  
Genes\_seq  
default  
master

***Bos taurus* (cattle) 5.2 (Current)**  
**Chromosome:** 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 [21] 22 23 24 25 26 27 28 29 X Y MT  
**Query:** 522442[[gene\\_id](#)] [clear]

**Master Map: Genes On Sequence** [Summary of Maps](#)

Region Displayed: 20,150K-20,840K bp

Genes_seq	Symbol	O	Links	Cyto	E	Description
	<a href="#">ACAN</a>	+	<a href="#">sv</a> <a href="#">pr</a> <a href="#">dl</a> <a href="#">ev</a> <a href="#">mm</a> <a href="#">hm</a> <a href="#">sts</a>	best RefSeq		aggrecan
	<a href="#">HAPLN3</a>	+	<a href="#">sv</a> <a href="#">pr</a> <a href="#">dl</a> <a href="#">ev</a> <a href="#">mm</a> <a href="#">hm</a>	best RefSeq		hyaluronan and proteoglycan link protein 3
	<a href="#">MFGE8</a>	+	<a href="#">sv</a> <a href="#">pr</a> <a href="#">dl</a> <a href="#">ev</a> <a href="#">mm</a> <a href="#">hm</a> <a href="#">sts</a>	best RefSeq		milk fat globule-EGF factor 8 protein
	<a href="#">ABHD2</a>	+	<a href="#">sv</a> <a href="#">pr</a> <a href="#">dl</a> <a href="#">ev</a> <a href="#">mm</a> <a href="#">hm</a>	best RefSeq		abhydrolase domain containing 2
	<a href="#">RLBP1</a>	+	<a href="#">sv</a> <a href="#">pr</a> <a href="#">dl</a> <a href="#">ev</a> <a href="#">mm</a> <a href="#">hm</a> <a href="#">sts</a>	best RefSeq		retinaldehyde binding protein 1
	<a href="#">MIR2363-1</a>	+	<a href="#">sv</a> <a href="#">dl</a> <a href="#">ev</a> <a href="#">mm</a>	best RefSeq		microRNA mir-2363-1
	<a href="#">MIR2363-2</a>	+	<a href="#">sv</a> <a href="#">dl</a> <a href="#">ev</a> <a href="#">mm</a>	best RefSeq		microRNA mir-2363-2
	<a href="#">FANCI</a>	+	<a href="#">sv</a> <a href="#">pr</a> <a href="#">dl</a> <a href="#">ev</a> <a href="#">mm</a> <a href="#">hm</a> <a href="#">sts</a>	mRNA		Fanconi anemia, complementation group I
	<a href="#">POLG</a>	+	<a href="#">sv</a> <a href="#">pr</a> <a href="#">dl</a> <a href="#">ev</a> <a href="#">mm</a> <a href="#">sts</a>	mRNA		polymerase (DNA directed), gamma
	<a href="#">TRNAR-UCG</a>	+	<a href="#">sv</a> <a href="#">dl</a> <a href="#">ev</a> <a href="#">mm</a>	tRNAscan SE		transfer RNA arginine (anticodon UCG)
	<a href="#">MIR9-1</a>	+	<a href="#">sv</a> <a href="#">dl</a> <a href="#">ev</a> <a href="#">mm</a>	best RefSeq		microRNA mir-9-1

# HH1 -Haplotype

- Exact mutation found.
  - CGA → arginine
  - T**GA → stop making this protein
- APAF1 gene is important for normal embryonic development (*apoptosis*).

# Will the haplotype status of an animal ever change?



you are here:- [Home](#)

## Official Genetic Evaluations for December, 2011

All reports are now available. See AIPL website for background information on updates in evaluation procedures for this run.

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❖ [Bulls](#)

❖ [Cows & Heifers](#)

❖ [Archive](#)

❖ [Background Info](#)

❖ [Links](#)

## JH1 Status Changes for Bulls

The Animal Improvement Programs Laboratory (AIPL) has refined its procedures for detecting the presence of Jersey Haplotype 1 (JH1) in the DNA sequences of genotyped animals. AIPL research geneticists can now distinguish a smaller segment of the affected DNA that is responsible for the fertility issues. Most of the changes in JH1 status involve the detection of crossovers believed to carry the lethal segment.

This more sensitive analysis resulted in a change in carrier status for 12 Jersey bulls. Eleven (11) bulls are now designated as tested carriers of JH1, with the status code JH1C now recorded in the AJCA database and published on Official Performance Pedigrees and genetic evaluation reports. Listed in order from youngest to oldest, these bulls are:

GR Oomsdale Lou CC Charnesa-ET 7JE1134  
BW Contador-ET 505JE116  
GR TJF Gannon Robinhood 7JE1066  
ISAU Riverside Automatic 200JE8155  
Selects Mark of Tennggen-ET 7JE678  
Osceola Aces Gypsy Traveler-ET 7JE516  
Rock Maple Ace MacKenzie-ET 7JE484  
Bridon Journey CAN139331  
Sunset Canyon Roman-ET 1JE415  
Schultz Duncan Shamrock 14JE185  
CDF Top Brass Earl Bloss-ET 7JE189

The test status of one bull initially identified as a carrier of JH1 has been changed to tested free (JH1F):

Sunset Canyon Vegas-ET 29JE3558

# The new normal.

- Due to modern genomic technology, undesirable genetic conditions are no longer considered rare.
- We expect to find them in some of our best genetic families.
- We should use the haplotype information to improve our breeds without causing undue economic hardship to the breeders of these animals.



***Thank you – Any questions?***

