



**FARMING**  
connect  
cyswllt  
**FFERMIO**

# Managing recessive disorders in the black and white breed

Farming Connect – Projects in Practice



08456 000 813 | [farmingconnect@menterabusnes.co.uk](mailto:farmingconnect@menterabusnes.co.uk) | [www.gov.wales/farmingconnect](http://www.gov.wales/farmingconnect)

# The Project

The main purpose of the project is to investigate the effects of the various fertility haplotypes (HH1, HH2, HH3, HH4, HH5) that have been discovered within the DNA of the black and white breed. The project will also investigate the influence of the Haplotype Cholesterol Deficiency (HCD) gene on calf mortality. New genetic screening technology and its commercialisation has uncovered some industry significant recessive disorders that were previously unknown within the Black and White breed. The term “haplotype” refers to a group of single-nucleotide polymorphism (SNP) markers that are located at nearby positions on the chromosome and are usually inherited together. Haplotypes are passed on from both parents and whether they cause harm or good depend on how these haplotypes are arranged in the offspring. As it is now possible to identify thousands of haplotypes on each chromosome; each has a positive, neutral or negative association with production, conformation, health and fertility. It is important to identify and understand which haplotypes cause a negative effect in order to breed around them to ensure that these effects are not passed on.

## Fertility Haplotypes

Haplotype	Timing of losses
HH1	ALL STAGES
HH2	PRE-100 DAYS
HH3	PRE-60 DAYS
HH4	EMBRYO
HH5	PRE-60 DAYS

Table 1. Timing of loss per haplotype

## The Farm

Shordley Hall is a high yielding 250 cow all year round calving Holstein herd based in Hope near Wrexham. Breeding healthy and efficient milking cows has been ongoing for over 35 years and still is one of the main business aspirations for the future prosperity of this family run business. The best quality forages are grown on farm fed to ensure maximum yields and rumen health. Mr Pilkington believed that some of his problem cows could have recessive haplotypes due to their consistent poor fertility performance and certain calves from individual cows and families of cows displayed the emaciation symptoms of the newly discovered Cholesterol Deficiency recessive disorder prior to their death around 6-12 weeks of age.



Fig 1. Calf displaying symptoms of Cholesterol Deficiency (CD)

## Project Summary

200 animals from all ages were genotyped for recessive disorders through Willows animal vets via the Zoetis clarified laboratories. Resulting haplotypes results were returned approximately a month after the hair follicle sampling undertaken by Owen Tunney the lead vet and project specialist. These results would then yield the prevalence of the various disorders and allow the avoidance of mating a carrier female with a carrier male.

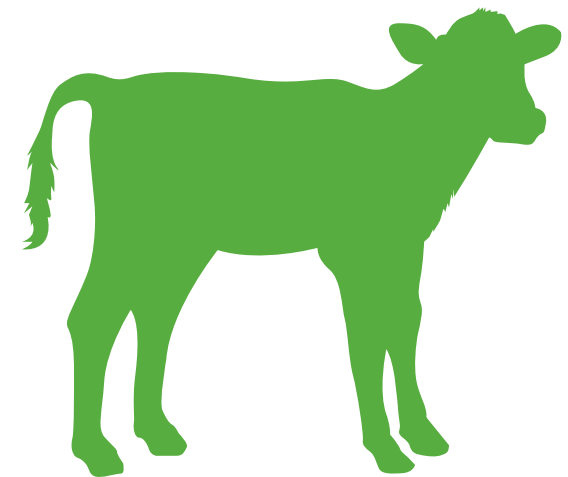
**25% of the females tested carried at least 1 genetic recessive**

**2% of the females carried more than one recessive**

**8% were carriers of HCD**

One of the highest genetic merit females tested (Calf no 3973) was a carrier of one of the fertility haplotypes and was a carrier of HCD. The project therefore highlights the importance of knowing the carrier status of your highest genetic merit females is essential to manage their matings. Carrier status does not mean you shouldn't breed from these animals. No calves were carriers of the favoured polled gene however 3 were carriers of the Red coat colour gene.

The clarified report would then be used to help select non-carrying bulls to mate with certain females. In the top ten available proven bulls for PLI (profitable Lifetime Index) there are two carriers of HCD, shown as HCD1 in table 2 below.



## (UK & Int) Top PLI Daughter Proven Bulls

This list is defaulted to rank by PLI, please note that you can re-rank on any of the column headings within the table.

50 of 622 results

Items per page

NAME	PLI £	PLI Rib %	TM	TM Rib	TOrig	Mam	L&F	Loc.	LS	SCC %	CS	FI	GBAI	NIAI	Sexed Semen
MOCON HCDO	689	77	0.89	72	ITB	0.96	0.35	0.11	0.7	-23	-0.11	6	BUL		
GEN-I-BEQ-LAVAMANET ET HCDI	684	97	0.64	96	ITB	0.79	0.98	1.38	0.3	-4	-0.93	15.7	SMX	SMX	
S-S-I SHAMROCK MYSTIC ET HCD0	654	80	0.85	74	ITB	0.56	-0.04	0.13	0.6	-20	-0.04	19.8	WWS	WWS	
DE-SU-I 1236 BALISTO ET HCD0	652	95	1.41	95	ITB	1.01	0.92	1.09	0.5	-21	-0.36	1.4	GEN	GEN	
VIEW-HOME LITTLEROCK ET RDF HCDI	646	76	0.65	71	ITB	0.95	0.81	0.96	0.5	-18	-0.58	8.7	SMX	SMX	
TEEMAR SHAMROCK ALPHABET ET HCD0	636	82	-0.08	75	ITB	-0.3	0.65	0.78	0.8	-3	0.29	18.5	GEN	GEN	
CO-OP ROBUST CARBRIOLET ET POF CDF HCD0	628	91	1.86	87	ITB	1.11	1.26	1.39	0.4	-8	-0.08	3.8		AIS	
APINA NORMAN HCD0	622	84	2.15	82	ITB	2.06	0.75	0.75	0.6	-10	-0.39	12		AIS	Y
EDG RUBICON ET HCD0	616	82	3.08	80	ITB	1.79	2.62	2.85	0.3	-14	0.56	5.3	CBL	CBL	Y
DE-SU ROOKIE I 1075 ET RDF HCD0	606	79	1.42	75	ITB	1.62	0.66	0.81	0.6	-27	-0.56	4.2	WWS	WWS	Y
DELTA G-FORCE CDF	603	88	1.08	77	ITB	0.96	1.55	1.37	0.4	-17	-0.7	6.3		AIS	
DELABERGE PEPPER ET VG85 HCD0	600	87	3.33	87	ITB	2.35	2.7	3.04	0.5	-15	0.85	8.6	WWS		
LADYS-MANOR L-BRN AMRYN ET HCDI	599	71	1.36	65	ITB	0.6	0.87	1.23	0.6	-27	-0.2	8.1	GEN	GEN	

Source: HUK. Table 2. Highest Available PLI proven bulls in UK as of April 2018

These bulls will have a significant impact on the genetic gain of UK herds and should not be disregarded or overlooked due to their carrier status. Likewise knowing the statuses of any resulting females from these bulls will allow for peace of mind when planning future matings.

## Production Benefits

Obvious production benefits from HCD testing will lead to decreased calf mortality % in young calves and the resulting potential loss of genetic gain. In terms of fertility haplotypes knowing the HH status of bulling cows and heifers can result in fewer repeats, straws to conception and eventually lower calving interval (a key KPI in AHDB Dairy optimal systems strategy for block calving). Project farmer Richard Pilkington described the production benefits to his herd's fertility "Certain cows would take a few services before they held despite strong heats and being correctly nutritional, it was no coincidence that these cows problem were also carriers of one of these fertility haplotypes".

## Calf Management and Calf Health Benefits

Calf rearing is an important aspect of Shordley Hall's dairy enterprise as calves are born all year round and surplus heifers and breeding bulls are frequently sold, a great emphasis is put on the calf rearing system. The previous loss of HCD calves despite first class management resulted in questions being asked as to why these calves did not survive past 3 months of age. "Certain calves from certain families seemed to not do so well and one particular cow had every heifer calf except one die under similar circumstances, we now know that she is a HCD carrier and the bulls mated to her were also carriers".

## Next steps

Richard Pilkington plans to continue genotyping every female heifer calf born for recessive disorders as well as for the potential of breeding polled heifer calves and breeding bulls. The project was also mentioned and publicised in the Holstein UK Journal article on Haplotypes written by HUK geneticist Darren Todd, the project has been a platform for HUK and AHDB Dairy to refine the way they denote and share the carrier status of bulls through farmer feedback during the open day.

The project has further raised awareness amongst dairy producers of the importance of considering the genetic recessive status of their own females via known parentage and possible genotyping of potential carriers.

**For further information please contact  
Rhys Davies – 07985379880**