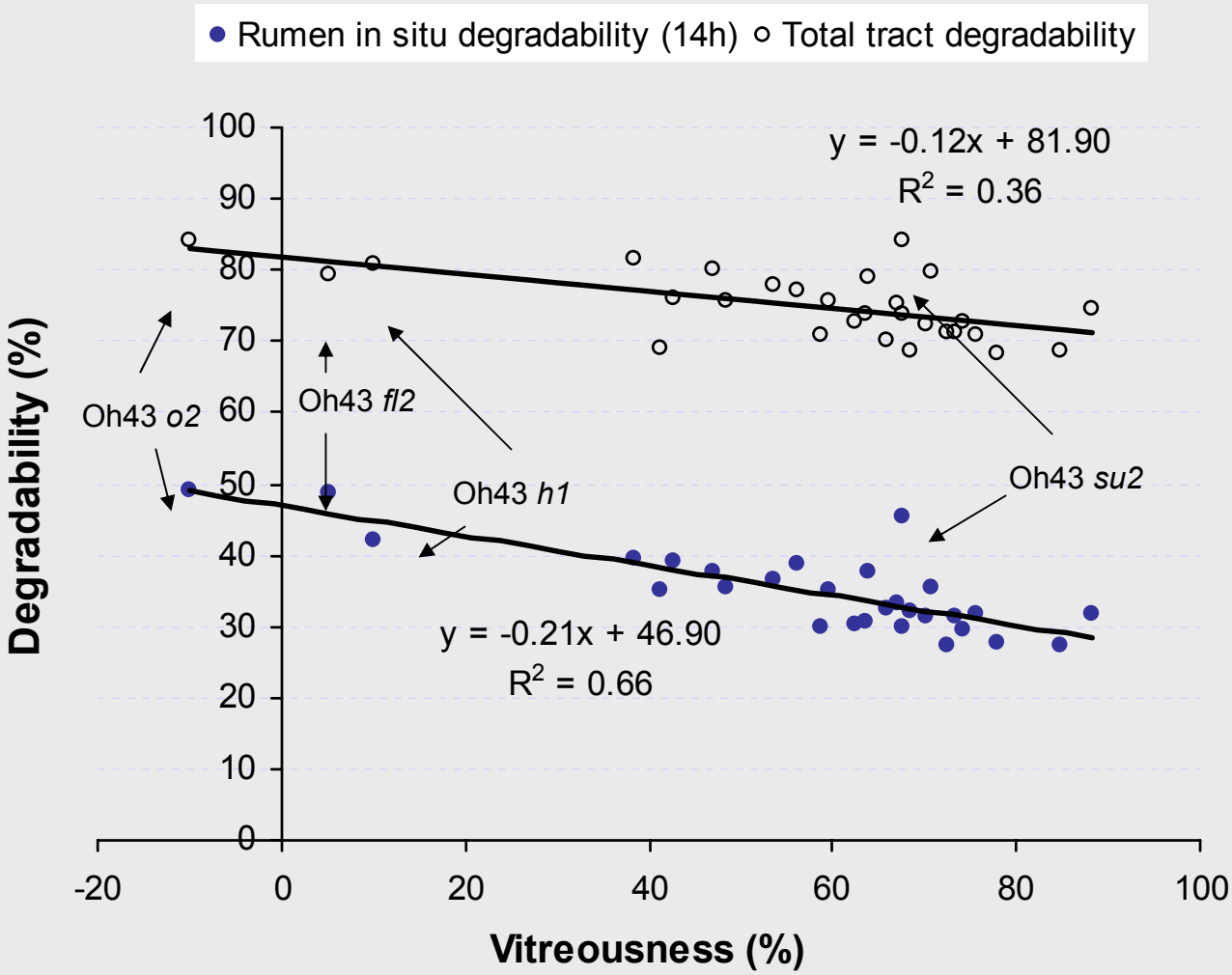
Starch Study A

Entries:	32 inbred lines and 1 population
Harvest dates:	½ milkline (ML, ~35% DM) Black layer (~15 d post ½ ML)
Experiment design (field):	RCB with 3 replicates Madison, 2002 1 self-pollinated row – 3.04 x 0.76 m 10 plants per row

Starch Study A
Entries

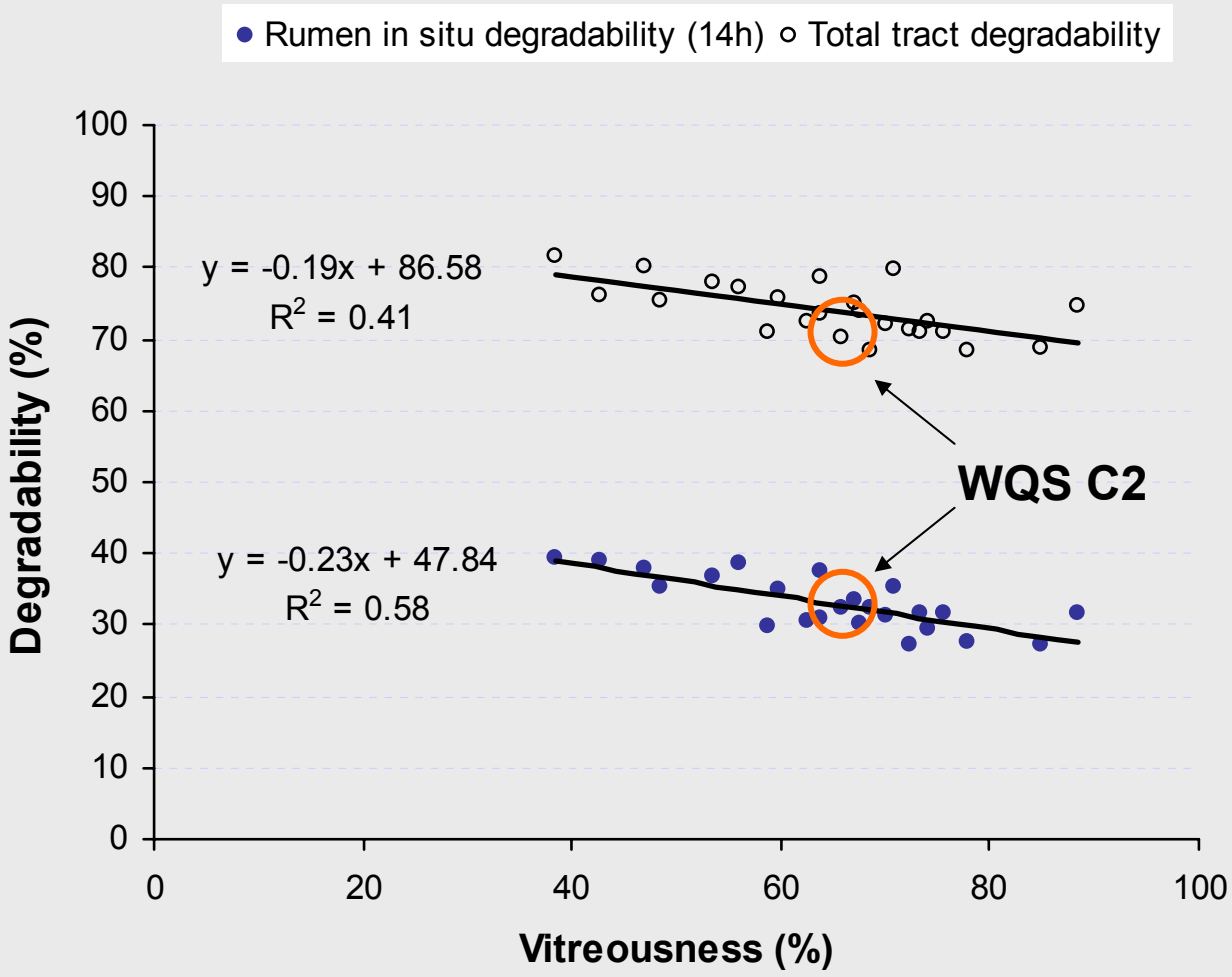
Oh43	AR16035:S02-447-1-B
Oh43 *su2*	AR16035:S02-611-1-B-B
Oh43 *o2*	AR16035:S02-666-1-B-B
Oh43 *ae1*	CHIS775:N1912-254-1-B
Oh43 *fl2*	CHIS775:N1912-347-1-B
Oh43 *h1*	CHO5015:N12-387-1-B
Oh43 *wx1su2*	CHO5015:N15-143-1-B
	CHO5015:N15-182-1-B
WQS C2	CHO5015:N15-8-1-B
CML176	CUBA164:2008a-23-1-B
NC398	CUBA164:S15-184-1-B
NC410	CUBA164:S15-192-2-B
NC412	CUBA164:S15-435-1-B
NC414	CUBA164:S2008a-3-1-B
NC416	DREP150:N2011d-13-1-B
B73	FS8B(T):N1802-35-1-B
W64A	UR13085:N0215-3-1-B

Black Layer Stage



Vitreousness estimated using NIRS prediction

Black Layer Stage



Vitreousness estimated using NIRS prediction

Starch Study B

Four near isogenic lines:	Oh43
	Oh43 *su2*
	Oh43 *o2*
	Oh43 *fl2*
Harvest dates:	½ milkline (ML, ~35% DM)
	5 d post ½ ML
	10 d post ½ ML
	Black layer (~15 d post ½ ML)
Experiment design (field):	RCB with 3 replicates
	Madison, 2002
	3 self-pollinated rows – 3.04 x 0.76 m
	10 plants per row

Procedure – Two-Stage Starch Digestion (Pioneer Hi-Bred International, Inc.)

STAGE 1 - in-situ ruminal incubation

- Two steers with ruminal cannula – 2 wk adaptation to 70% (DMB) corn silage diet
- In-situ procedure:

Corn kernels ground with Wiley Mill (6mm screen)

1.5g ground material placed in 5 x 5 cm dacron bag,
eight replicate bags incubated for each sample

Placed in rumen for 0 and 14 h,

Removed, rinsed and dried at 62^{o}C for 24 h

STAGE 2 - post-ruminal in-vitro incubation

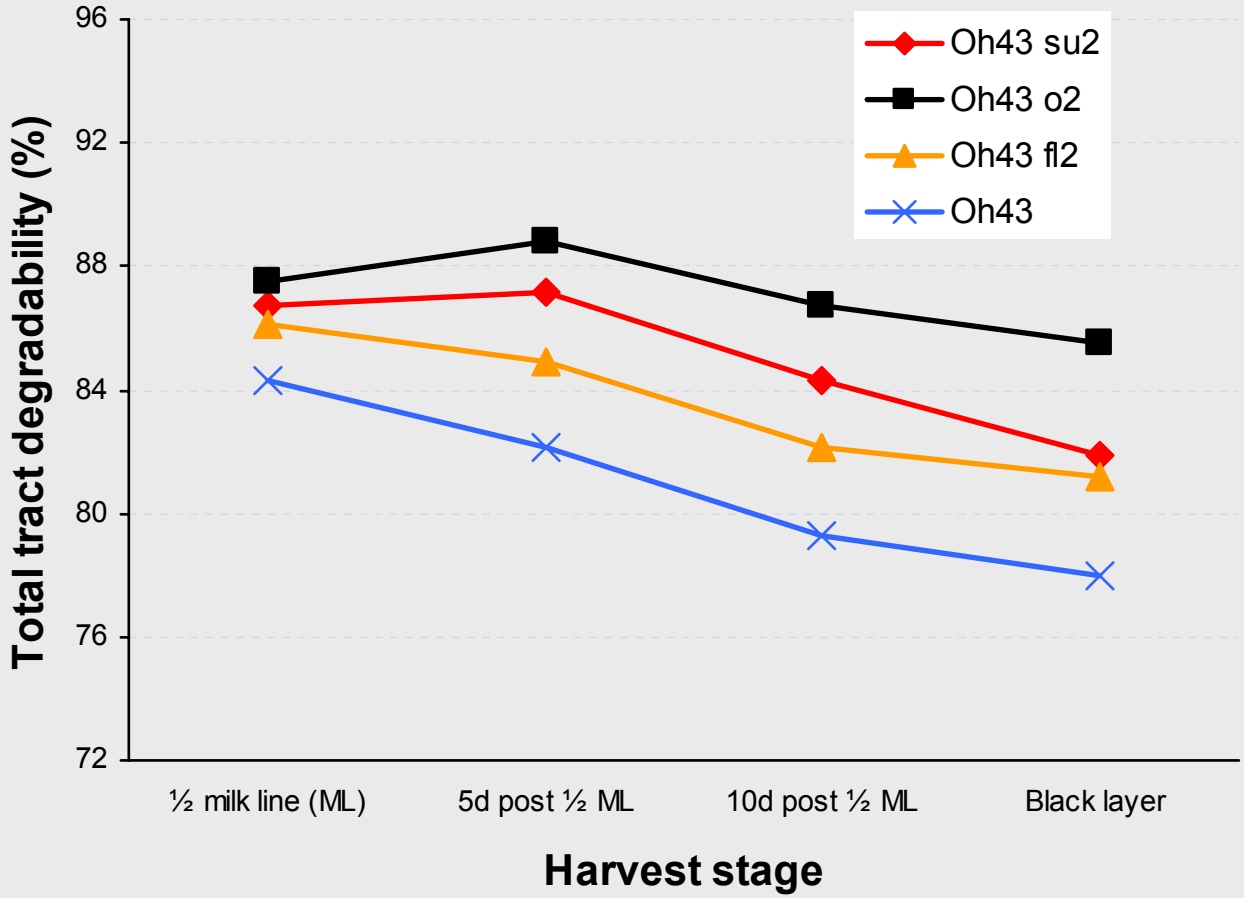
14-h ruminal residue subjected to 8 h incubation
intestinal enzymatic cocktail (pepsin + pancreatic enzymes)

Removed, rinsed and dried at 62^{o}C for 24 h

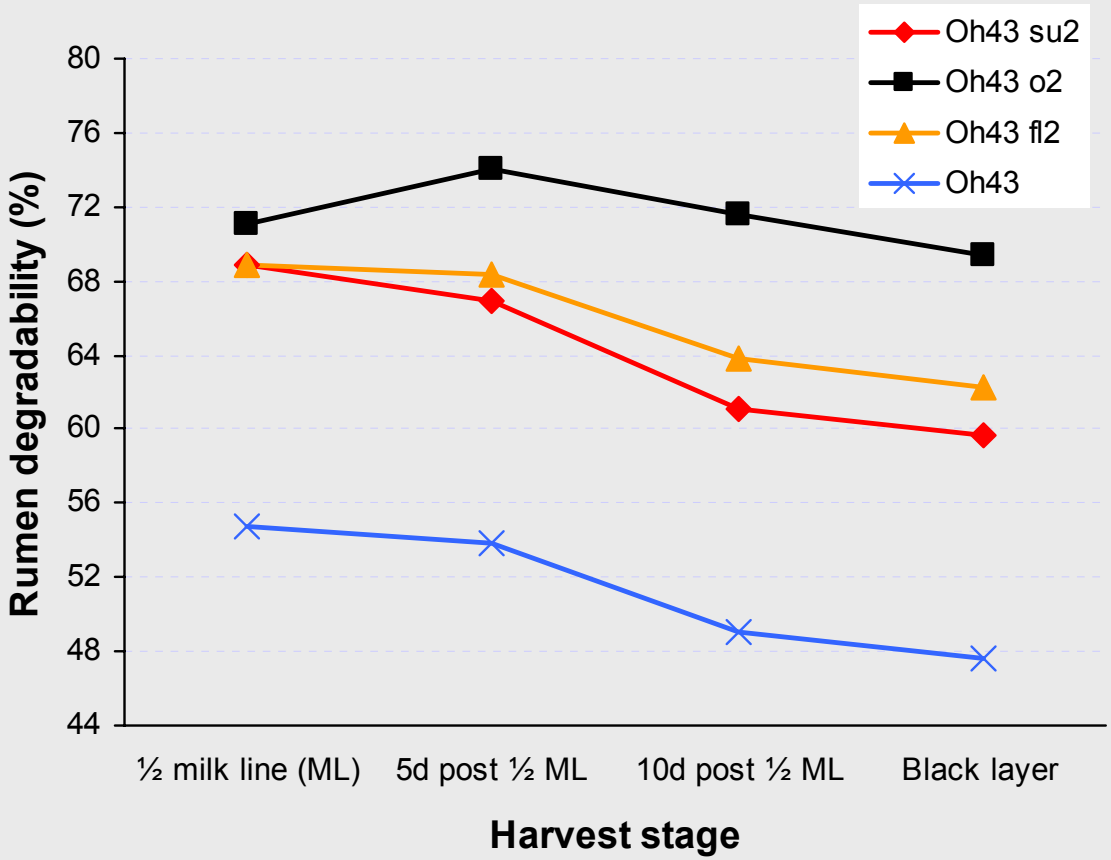
Final Action

Eight replicates for DM disappearance
Eight replicated bags composited for a single starch analysis

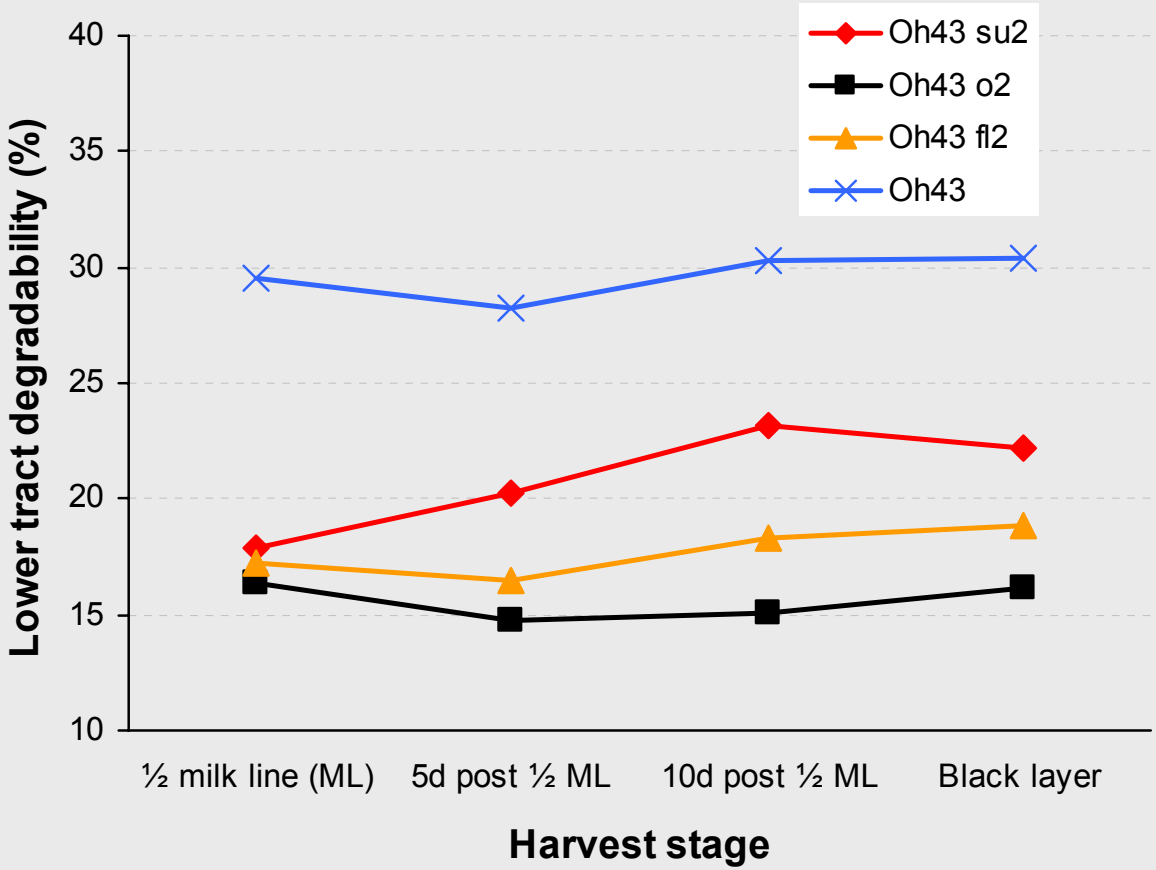
Total Tract Degradability



Rumen Degradability



Post Ruminal Degradability



Starch Studies
Conclusions

There is genetic variation for starch degradability independent of maturity effects, and this may also relate to site of starch degradation.

Kernel vitreousness can be used as a breeding screen for ruminal and total starch degradation.

In vivo studies are necessary to evaluate the appropriate levels of ruminal versus post-ruminal starch degradation to maximize overall energy obtained from silage.