

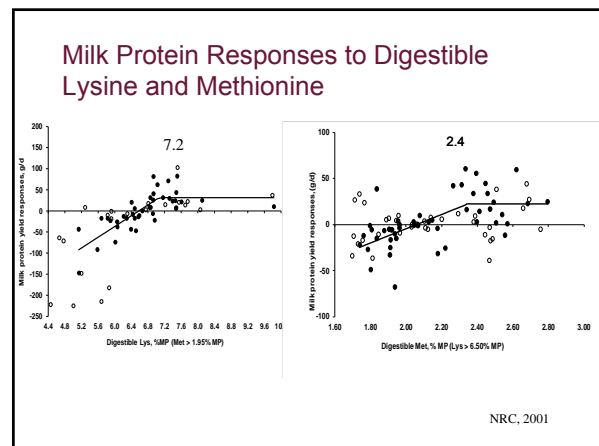
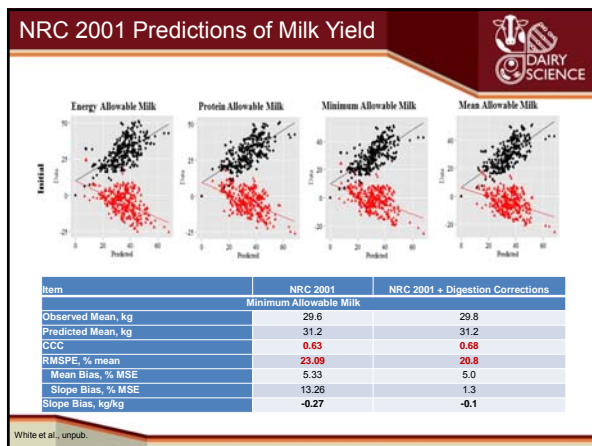
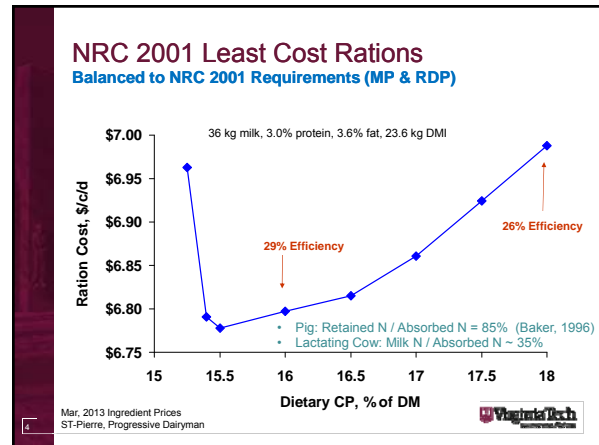
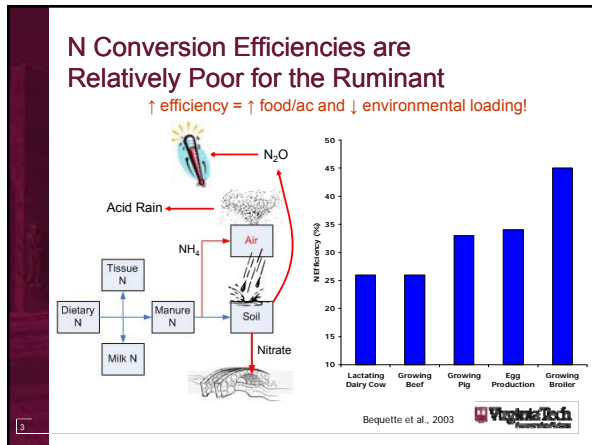
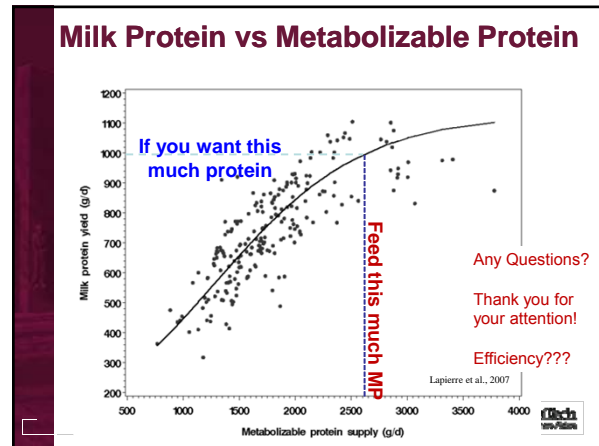


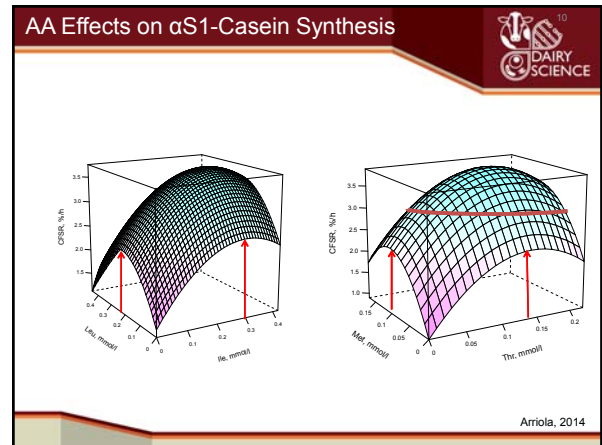
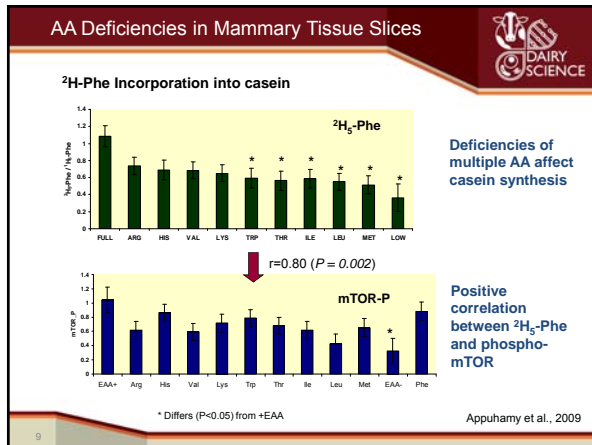
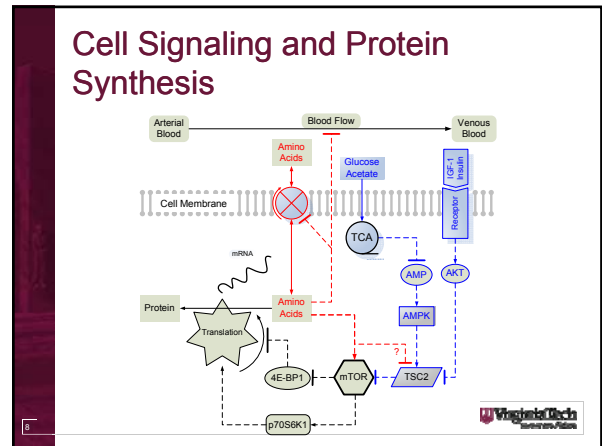
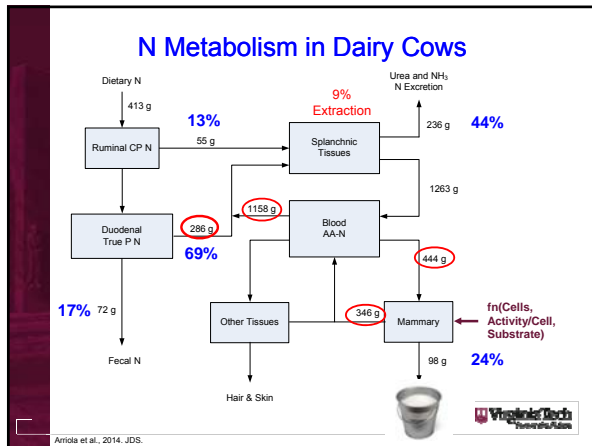
An Update on Protein and Amino Acid Feeding

USDA: AFRI Grant: 2012-67016-19464, 2017-??, & Hatch
 Pratt Foundation & VT College of Ag and Life Sciences
 VA State Dairymens, VA Ag Council, Canadian Dairy Farmers
 Balchem, Perdue Ag, Papillon, Purina, Poultry Profit/Fat Res Council, AFIA iFeeder
 Evonik, Adisseo



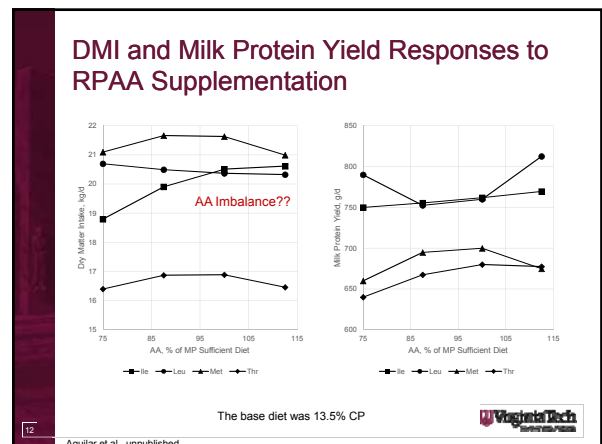
M. D. Hanigan, R. R. White, S. Ariola, M. Aguilar, J. Castro, K. Estes, A. Myers, X. Feng
 Dept. of Dairy Science

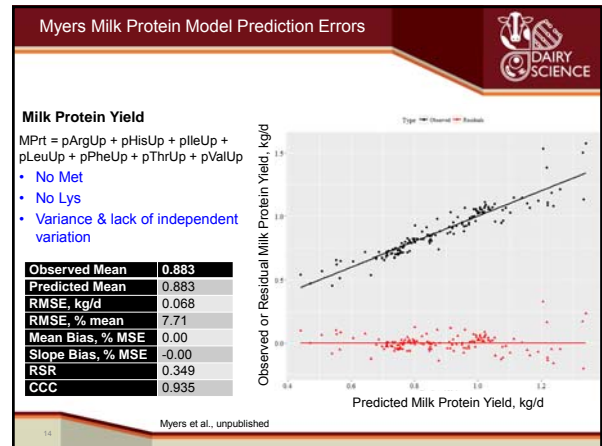
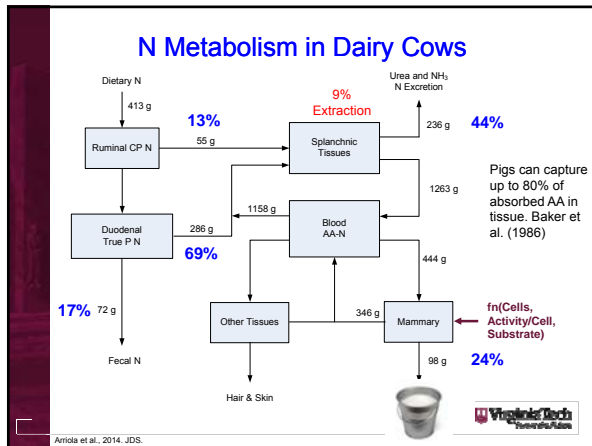





Mice Litter Weight Gains in Response to EAA

Dietary Protein	15%	15%	15%	15%	15%	21%	SEM	P
Amino Acid Supplement	-	+Leu	+Ile	+Met	+Thr	-	1.3	0.07
Food Intake(g/d)	13.0 ^a	12.5 ^{ab}	13.1 ^a	12.1 ^b	12.1 ^b	12.8 ^{ab}		
Birth weight(g)	15.4	15.4	15.4	14.9	15.5	14.8	1.4	0.54
Litter weight gain (g)	67 ^c	78 ^a	77 ^a	78 ^a	69 ^c	85 ^a	9.6	<0.001
Infanticide rate(%)	5.6	6.9	1.9	5.0	6.9	1.2		
Cell Signaling								
P-mTOR/T-mTOR	0.73 ^b	1.15 ^a	0.98 ^a	1.07 ^a	1.06 ^a	1.13 ^a	0.09	0.03
P-4eBP1/T-4eBP1	0.75 ^b	0.82 ^b	1.2 ^a	1.05 ^{ab}	1.13 ^a	0.91 ^b	0.09	0.007
P-S6K1/T-S6K1	0.91	0.97	1.1	1.3	0.99	1.22	0.10	0.31
P-eEF2/T-eEF2	0.93	0.94	0.85	0.95	0.83	1.04	0.10	0.68
P-eIF2 _α /T-eIF2 _α	1.08	1.07	1.03	0.96	0.93	1.03	0.09	0.83
Gene Expression								
β-casein	1.0 ^c	5.1 ^{bc}	1.8 ^c	7.9 ^{ab}	1.4 ^c	9.8 ^a	2.26	0.001
mTOR	1.0 ^c	7.3 ^b	1.6 ^c	13.1 ^a	1.9 ^c	7.7 ^b	1.3	<0.001
S6K1	1.00 ^{bc}	1.22 ^b	0.24 ^c	0.60 ^c	0.31 ^c	3.87 ^a	0.47	<0.001
eEF2	1.00 ^a	0.43 ^{ab}	0.17 ^{bc}	0.32 ^{bc}	0.47 ^b	0.13 ^{cd}	0.17	<0.001
eIF2 _α	1.00	0.34	1.15	0.34	0.27	0.82	0.51	0.20

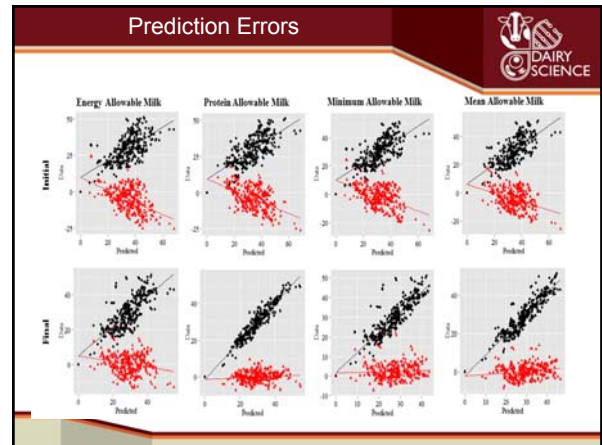




Empirical Predictions of Milk Yield

Item	NRC 2001	NRC 2001 + Digestion Corrections	NRC 2001 + Ener & AA Efficiency	Indep Eval
Minimum Allowable Milk				
Observed Mean, kg	29.61	29.8	29.8	30.7
Predicted Mean, kg	31.19	31.2	27.5	28.2
CCC	0.63	0.68	0.86	0.75
RMSPE, % mean	23.09	20.8	16.6	17.3
Mean Bias, % MSE	5.33	5.0	24.7	26.7
Slope Bias, % MSE	13.26	1.3	0.7	4.0
Slope Bias, kg/kg	-0.27	-0.1	<0.1	-0.2
Mean Allowable Milk				
Observed Mean, kg	29.61	29.8	29.8	30.7
Predicted Mean, kg	33.58	34.4	29.8	30.4
CCC	0.61	0.63	0.93	0.84
RMSPE, % mean	25.25	22.7	10.8	12.6
Mean Bias, % MSE	28.27	34.3	<0.1	0.5
Slope Bias, % MSE	8.43	2.8	5.1	4.4
Slope Bias, kg/kg	-0.24	-0.17	0.1	-0.1

White et al., unpub.



Summary

- AA are very important!
- Representation of effects is complicated
 - Multiple AA
 - Energy
 - Hormones
 - Integrated response
 - Nyet** on the barrel with broken staves
 - Can't be done by guess and by golly
- Excellent modeling progress
- USDA funding was renewed
- Look for a new model soon in theaters near you
- Upgrade your optimizer skills

Virginia Tech